Navigation exam questions

Q 1: - list the nautical publication required for passage planning.
Ans: -

1) voyage charts
2) Sailing direction.
3) A T T.
4) A L R S.
5) A L L.
6) Routing charts.
7) Ocean Current atlas.
8) Tidal stream Atlas.
9) Accumulative list of correction.
10) Annual summary of admiralty notice to mariner.
11) Mariner's guidance note.
12) Mariner's information note.
13) Merchant shipping notice
14) I M O routing guide
15) Ocean passage of the world.
16) Mariner's hand book.
17) Weekly Notices to mariner.
18) Nautical almanac.
19) Chart catalogue.
20) International code of signal.
21) Instruction and operating manual.
22) Distance table.
23) Symbols and abbreviation 5011.
24) Local passage planning charts (e.g. chart 5500)
25) Ice charts.
26) Climatological Atlases.

Q 2: - list the content of nautical publication required for passage planning.
Ans:-
Voyage charts:-

1) Chart's NO. with prefix (B A –British Admiralty)
2) Chart's scale.
3) Chart's edition.
4) Depth of sea bottom at datum height.
5) Land feature.
6) I M O Adopted T S S.
7) Area covered by charts (i.e. bottom margin and top margin in lat and long.)

Sailing direction: - these are published in 72 volumes covering the whole ocean area.

1) General information and local knowledge of the area
2) Port facilities.
3) Navigational hazards regarding port entry.
4) System of buoyage.
5) Coast line views and chart information

Admiralty tide table:-

Tide table	1) Daily prediction for the time and height of high water and low water. 2) Selection of standard ports. 3) Correction to standard ports information enabling daily prediction for secondary ports. 4) Graphs enabling an estimation of tide height at time in between high water and low water. 5) Also include some tidal stream prediction.

Admiralty list of Radio signal's contents

Volume	Name	Information's
Volume-1	Coast radio stations	1) Maritime public correspondence stations, 2) global marine communication systems, 3) ship reporting systems, 4) piracy and arm robbery reporting procedures, 5) list of shore based MMSI numbers
Volume -2	Radio aid to navigation.sattelite navigation system. Legal time. Radio time signal. electronic position fixing system	1) List of all direction finding stations. 2) List of all radar beacons 3) Major satellite system explained. 4) List of beacons transmitting. DGPS beacons 5) Day light saving time and dates. 6) Time signals broad cast details. 7) Electronic position fixing systems details.
Volume -3	Maritime safety information services	1) Maritime weather services. 2) Maritime safety information services. 3) World wide listing of NAVTEX stations. 4) Submarine and gunnery warning details. 5) World wide listing of radio-facsimile stations and map area.
Volume -4	Meteorological observation stations	Worldwide meteorological observation stations listed.
Volume -5	Global maritime safety and distress system (GMDSS)	1) Global communication requirements for distress. 2) SOLAS compliant guide for. 3) Diagram showing coverage of maritime search and rescue stations. 4) Diagram showing worldwide operational DSC range. 5) Information for GMDSS students.
Volume -6	Pilot services, vessel traffic services, port operation	1) Detailed pilot information's. 2) Global vessel traffic services information. 3) Diagrams showing reporting points, pilot boarding areas and ports. 4) Harbour communications.

Admiralty list of lights:-

1) Characteristics of all navigation lights and beacons.
2) Position of the light
3) Name of the light.
4) Height of the light from charted datum.
5) Range and flashing characteristic of the light.

Information on Routing charts

S.NO.	Information
01	Ice information –maximum ice limit
02	Mean temperature guide
03	Prevailing wind rose
04	Recommended track and distances
05	Load line limits zone for time of year
06	Ocean currents, predominant current direction ad speed in knots
07	Dew point and mean sea temperature
08	Percentage frequency of beau fort wind force of 7 and over, predominant TRS
09	Area of low pressure and high pressure
10	Scale of the chart
11	Ice berg limit and pack ice limit
12	Load line for mediterenanien sea, Suez channel, and black sea.

Ocean Current atlas. - ocean current maybe considered more constant then tidal streams and many flow throughout the year with only small changes in direction and rate. Other may suffer seasonal changes when monsoon wind changes. The main example of these changes is North Indian Ocean area at the change of south west and North West monsoon.

Tidal stream Atlas.

Tidal stream atlases	1) Diagrams showing major tidal streams of NW Europe. 2) Direction and rate off tidal streams. 3) Mean neap and spring tidal rates. 4) Horizontal water movement.

Accumulative list of Notice to Mariner N.P - 234:- these are issued in January and July of each year. These contain the list of all correction which are been issued since last three years and also the list of latest nautical publication.

1) Date of latest edition of each admiralty chars
2) Numerical list of all admiralty notice to mariner numbers affecting a particular char during the past two and half year.
3) Australian and New Zealand charts which are republished with in the admiralty series receive the same treatment.

ANNUAL SUMMARY OF ADMIRALTY NOTICE TO MARINERS

S.No.	Chapter No.	Name of chapter
01		T's&P's in force as of January 1st
02	1	Admiralty tide tables
03	2	Suppliers of admiralty chars and publications
04	3	Safety and British merchant ships in tension,crisis,conflict of war
05	4	Distress and rescue at sea vessels and air craft 1) Distress and safety communications. 2) Statutory duties of master of vessel. 3) Vessel in distress. 4) Aircraft in distress
06	5	Firing practice and exercise area
07	6	Former marine danger area, cleared routes and instructions regarding explosives picked up at sea.
08	7	UK and Russian federation agreement on prevention of incidents at sea beyond territorial waters.
09	8	Information concerning submarine 1) warning signals 2) Light shown when on surface. 3) Sunken submarine procedure.
10	9	Hydro graphic information
11	10	Mine laying and mine counter measure exercises
12	12	National claims to maritime jurisdiction
13	13	Worldwide navigational warning service and world meteorological organization
14	15	Under keel clearance allowance
15	16	Protection of historic,dangerous,and military wreck site
16	17	Traffic separation schemes
17	17A	UK automatic ship identification and reporting system and automatic shipindentification system
18	18	Carriage of nautical charts and publication-regulation (International code of signals, The mariner hand book,MSN,MGN,and MIN,Annual summary notice to mariners, list of radio signals, list of lights, Sailing directions, nautical almanac, Tide table, tidal stream atlases.)
19	19	Satellite navigation system position and charts accuracy
20		Canadian charts and nautical publication regulation
21	22	US Navigation safety regulations
22	23	High speed craft
23	24	Submarine cable and pipe line
24	25	Electronic navigational charts (Limitation of ENC)

Mariner's guidance note. **(M G N)**

1) Are blue.
2) Provide guidance and advice to relevant parties in order to improve the safety of shipping and life at sea and pollution prevention
3) Are numbered in sequence from M G N – 1

Mariner's information note. (M I N)

1) Are green.
2) Provide information for more limited audience/readers e.g.:- training establishments, equipments manufacturers, or which will be used for a short period of time.
3) Have a fix cancellation date which usually 12 month after publication.
4) Are numbered in sequence M I N – 1

Merchant shipping notice (M S N)

1) Are white.
2) Are used only to convey mandatory information which must be complied with under U K legislation.
3) Relate to statuary instruments and contain technical detail of regulation
4) Are numbered in sequence
5) Continuous the sequence in use prior 11th march 1997 but with prefix M S N.

I M O routing guide: - the purpose of ship routing is to improve the safety of navigation in converging area and in area where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea room, the existence of obstruction to navigation, limited depth or unfavourable meteorological conditions and information on traffic separation scheme **(adopted or Non – adopted)**

1) Definitions
2) Routing system
3) Traffic separation scheme
4) Separation zone or line
5) Traffic lane
6) Round about
7) Inshore traffic zone
8) Two way route
9) Recommended route
10) Recommended track
11) Deep water route.

Ocean passage of the world.-Ocean **routes** to port to port around the worlds it has two parts and 10 chapters.

Part -1

Chapters

1) Planning a passage
2) North Atlantic ocean
3) South Atlantic ocean
4) Caribbean sea and gulf of México
5) Mediterranean Sea.
6) Indian Ocean.
7) Pacific Ocean and sea boarding it.

Part -2

8) Introductory remarks and Atlantic Ocean and Mediterranean sea sailing rules.
9) Indian Ocean, Red sea and eastern archipelago sailing routes.
10) Pacific ocean sailing rules

Table, gazetteer and index

Table-a –beau fort wind scale
Table –b – seasonal wind/monsoon table-west pacific and Indian Ocean.
Table C- tropical storm table.
Gazetteer
Index to general subjects and routes.

Contents of Mariner's hand book (it has 9 chapters)

S.NO.	Chapter' contents
01	Charts books, system of name, international hydro graphic organization, and international maritime organization.
02	The use of charts and other navigational aids
03	Operational information and regulation.
04	The sea (tide, tidal stream, ocean currents and waves.
05	Meteorology
06	Ice (sea ice, ice berge,ice glossary)
07	Operation in polar region and where ice is prevalent
08	Observing and reporting
09	IALA maritime buoyage system
10	Annexes, glossary and index

Weekly notices to mariners

S.No.	Section	Information
01	I	Index to section II together with Explanatory note
02	II	Notice for correction to charts .these includes all notices affecting navigational charts and listed consecutively from onset of the year. The section also includes temporary (T) and preliminary (P) notices to the week. The list weekly notice of each month will also list the temporary and preliminary notices which are remaining current. Any new addition of the charts publication issued is listed in this section. Typical examples include- sailing direction or list of lights etc.latest edition of publications are listed at the end of march, June September and December. Updates to standard navigation charts
03	III	Navigational warning are reprinted in this section .all warning which are in force are included in the first weekly notice of each year. Additionally all long range warnings issued during the week are included in this section and listed on a month basis. List of NAVAREA, HYDROLANT, and HYDROPAC messages. Reprint of radio navigational warning
04	IV	All correction affecting admiralty sailing direction which is published that week. A cumulative list of that correction in force is also published on a monthly basis. Amendment to admiralty sailing direction
05	V	All correction required for the admiralty list of lights and fog signals. Mariners are advised that these corrections may not be coincident with any chart correcting information. Amendment to admiralty list of light and fog signals
06	VI	Correction to admiralty list of radio signals are contained in this last section. Amendment to list of radio signal

Contents of Nautical Almanac

S.NO.	Contents
01	Altitude correction table for sun, stars and planets. `
02	Additional refraction correction for non-standard condition
03	Title page, preface etc
04	Phase of the moon
05	Calendars
06	Eclipses
07	Planet notes and diagram
08	Daily pages: ephemeredes of sun,moon,aries and planets, sun rise, sun set,twilight,moon rise, moon set,etc
09	Explanation
10	Standard time
11	Star chart
12	Stars:SHA and Declination of 173stars in order of SHA accuracy 0.1
13	Polaris table (pole star)
14	Sight reduction procedure: direct computation
15	Concise sight reduction table
16	Form for use with concise sight reduction table
17	Conversion table of arc to time
18	Table of increments and correction for sun,planets,aries and moon
19	Table for interpolating sun rise,sunset,twilights,moon rise, moonset , moon's meridian passage
20	Index to selected stars
21	Altitude correction table for the moon.

Chart catalogue. - This publication is 10 parts

1) The U K products and services.
2) Navigational charts.
3) Thematic charts.
4) Navigational publications.
5) Digital products.
6) Miscellaneous products and services.
7) Leisure products.
8) Advertisers.
9) Numerical index.
10) Price list.

At last direction for correction this volume

International code of signal.

International code of signal	Procedures of communication in language difficulties

Instruction and operating manual. - operating instruction and error instruction.

Distance table. - Distances of the world ports to ports. Name of the measure ports in alpha biotic.

Symbols and abbreviation 5011. - Symbols and abbreviation used on admiralty charts.

Climatological Atlases:-

1) Air temperature
2) Sea temperature.
3) Wind
4) Rain fall
5) Humidity
6) Tropical revolving storms
7) Pack ice limit
8) Ice Berge drift limit
9) Fog and reduced visibility

Q 3:-explain the factor to be taken into account when determining an appropriate route for a given passage including load line, oceanography and climatological factor.
Ans:-
Load line factors;-

1) International Load line zones.
2) Seasonal area.
3) Time of the seasonal area.

Oceanography factors:-

1) Position of the I T C Z
2) Wind direction and force.
3) Position of low pressure and high pressure area
4) Ice limit and its concentration.
5) Visibility in route area.
6) Navigation hazards.
7) Constancy of ocean currents.
   a) **Vector mean currents charts** :- the mean vector indicates the over all moment of water at the point of observation, which is at mid length of the vector .the arrow represent the long term displacement of water indicated by direction and thickness of the arrow. The vector mean current is resultant of all components of the observation considered forgiven area. The components are different of North/South, and East/West movements.
      I. The average drifts of object over along period of time.
      II. Drifting ship or other derelicts.
      III. Survival craft for search and rescue purpose.
      IV. Ice Berge movement

b) **Predominant current charts.-**this is the format used to indicate current on ocean routing charts. The arrow points in the appropriate direction and the main body of the arrow indicates the change in direction in that locality. The rate may be indicated at the tail either as a whole figure (or as fraction)

The constancy is represented by the thickness of the arrow.

I. High constancy is when a large percentage (over 75% or 67%) of observation confirm the water movement in the indicated direction.
II. Low constancy where a small percentage (less then 50% or 33%) of observation confirms water movement in the indicated direction shows variable in rate and direction.

c) **Current rose charts: -** these charts provide data on the variation of ocean at the point of observation or interest. The information is presented in the form of current rose. It is based on all observation recordedst0.5knots or more.
The data is dived in 16 division of the compass and may be present either amalgamated or sub-dived direction. The length of the arrow is determined by calculating an average rate based upon the percentage frequency of all observed figure in that direction.

Climatological factors:-

1) Air temperature
2) Sea temperature
3) Wind
4) Rain fall
5) Humidity
6) Tropical Revolving storm
7) Pack ice limit
8) Ice Berge drift limit
9) Fog and reduced visibility

Q 3: - Demonstrates the use of genomic charts in conjunction with a Mercator charts for voyage planning.

Ans:-

Genomic charts:-

Uses;-

1) Arrival and departure position to be plotted on gnomic charts.
2) Straight line to be drawn on gnomic chart. Between departure and arrival position.
3) An appropriate longitude interval for daily change (24 hourly basis) to be taken from gnomic charts. (lat/long.)
4) These lat/long to be transferred on Mercator charts .
5) Now various great circle courses transferred on Mercator charts which will be a rhumb line courses.

Advantages:

1) Gnomic charts are used to draw great circle on charts directly.
2) All area including Polar area can be projected without distortion.

Disadvantages:

1) Rhumb lines courses and bearings cannot be laid off easily as they appear curved.
2) Bearing and positions cannot be transferred from one part of the chart to another as parallel lines, because the meridians are convergent.
3) Measurement of distances and courses is difficult.

Mercator charts;

Advantages:

1) Rhumb line courses are easily laid off as strait lines.
2) Distances are easily measured as scale of distances = scale of latitude.
3) Shapes of landmasses in the neighbourhood of a point are correctly shown.
4) Angles between rhumb lines are unaltered between the earth and the chart.
5) Direction remain correct through distortions of areas occur.
6) Direction and position lines can be transferred correctly from one part of the chart to another as parallel line .this difficulty which is often used by a navigator for obtaining running fixes is not available in most projections.

Disadvantages:

1) Great circle courses cannot be laid off easily as they would appear curved.
2) Polar region can not be represented due to extremely large distortation.
3) The scale of distances which is the scale of latitudes is a varying unit.
4) Area can not be compared due to the varying distortion.

Q 4: - explain and out line the advantage and disadvantage of weather routing.

Ans: - weather routing is means of providing the best track for a vessel's voyage from port to port taking in to consideration:-

1) Weather forecasts over the voyage period
2) Estimated sea conditions.
3) Vessel characteristics.

The following should be considered in weather routing:-

The best time track

Advantages

1) Maximum safety.
2) Crew comfort
3) Minimum fuel consumption
4) Minimum time on passage

Climatic condition: - combined climatic and operational consideration including any or all of the following.

1) Recommendation obtained from reference to the publication ocean passage or the world and other climatological publications.
2) Type of the vessel, draft and state of loading
3) Time of year and the expected weather and sea condition.
4) The possibility of gale force wind causing delay or damage to vessel.
5) The possibility of ice or fog, causing delay or deviation from the planned route.
6) Whether the vessel is ice strengthen and suitably equipped for ice regions.
7) The strength and direction of adverse or favourable currents.
8) The need to carry out operational task such as hatch or tank cleaning.

Commercial influences on choice of route;-

Commercial condition could include any or all of the following items:-

1) The term and clauses of the charter party.
2) The owner's and charters direct instruction.
3) The entering or avoiding Load Line Zone and the acceptance or rejection of extra cargo.
4) The extra distance of alternative routes considered against fuel cost and time.
5) Costs of employing shore routing services.
6) Costs of delay incurred by use of a Least-Damage route as compared with a Least Time Route.

Disadvantage:-

1) Expensive.
2) Not necessary that weather which is predicted by weather routing vessel will experience.
3) Vessel may experience due to local phenomena a different weather.
4)

Q 5: - describe the factor to be considered when making a land fall.

Ans:-

1) Chart in use should be of large scale and appropriate.
2) Draft of the ship with respect to available depth of water.
3) Current direction and rate of set and drift.
4) Time of high water and low water.
5) Traffic density in the area.
6) Manoeuvring characteristics with respect to stopping distance and turning ability.
7) Pilot boarding area and V H F channel.
8) Visibility (darkness,fog,etc)
9) Operational condition of G P S RADAR, echo sounder and other navigational equipments.
10) Low laying coast line with few recognisable features or power full light from shore.
11) Depth contour to use.
12) Racon on land fall buoy or LANBY
13) Avoid lee shore with strong on shore wind.
14) Celestial observation can be used for checking land fall approaches.
15) Determine condition ,contingency plan and abort point.
16) When land fall position has been chosen assesses its adequacy for daylight, darkness and reduced visibility.

Q 6: - explain the objective of ship routing schemes.

Ans:-

Purpose;- the purpose of ship routing is to improve the safety of navigation in converging area and in area where the density of traffic is great or where freedom of movement of shipping is inhibited by restricted sea room. The existence of obstruction to navigation, limited depth or unfavourable meteorological condition.

Objective:-

1) The separation of opposing stream of traffic to reduce Head on situation.
2) Simplify the pattern of flow in converging area.
3) Reduce the danger of collusion between crossing traffic in establish shipping lane.
4) Organise safe traffic flow in area of off shore exploration and exploitation.
5) Reduce the risk of grounding where depth is critical.
6) Organisation of safe traffic flows in or clears of environmentally sensible area.
7) Guidance of traffic clears of fishing grounds or through fishing grounds.

Q 7: - explain the requirement when navigating in or near traffic separation schemes.
Ans: - The traffic separation scheme is to provide the safe route that reduce the risk of collision, casualties including of T S S , two way routes, inshore route, deep water route, round about, and recommended tracks.
The following should be complied when navigating in or near traffic separation scheme.

1) Col reg Rule No.10 must be complied at all time.
2) Bridge watches should be doubled.
3) Wheel on hand steering.
4) Lookout posted.
5) Master informed.
6) Fixes should be frequently
7) Land marks should be identified for position fixing.
8) Radar should one on navigation and one should be on collision avoidance.
9) Engine watches should be doubled.
10) Engine on stand by on manoeuvring speed.

Q 8: - explain the precaution to be taken when navigating in or near the vicinity of offshore installation, safety zones and safety fairways.
Ans: - The following precaution should be observed when navigating in or near off shore installation.

1) Master conning the vessel
2) Manual steering engaged
3) Recommended route and fair way followed
4) Safety zone 500mtrs observed
5) Radar set in anti collision mode
6) Look out briefed for heavy traffic density
7) Continuous position monitoring required
8) Safe speed maintained for all over condition
9) Engine room manned and vessel ready manoeuvre
10) V H F listening watch maintained
11) Continuous weather and visibility monitored
12) Anchor's readily available (use with caution)
13) Correct light and shaped displayed
14) Largest scale charts used
15) Moment and log book maintained

Q 9: - explain the procedure to be followed in the event of

a) **engine failure**
b) **steering gear failure**
c) **malfunction of navigation equipments**
d) **onset of adverse weather**

Ans:-

Engine failure:-

1) Inform master.
2) Make use of the head way and steer vessel towards safety using rudder and bow thrusters to the best advantage.
3) Plot vessel position.
4) Check traffic around the vessel.
5) Exhibit N U C (not under command) light /shape.
6) Commence sound signalling.
7) Prepare for emergency anchorage (if depth allows)
8) Inform the coast authority and broad cast urgency message to vessel in vicinity.
9) Check the rate of drift, if drifting on to alee shore sends distress.
10) Obtain latest weather report. Estimate the time available before vessel stand in danger.
11) Be in contact with engine room and check for repair progress.

Steering gear failure:-

1) Engage emergency steering.
2) Inform master and engine room
3) Use bow thrusters
4) If in shallow water. Prepare for anchoring.
5) Display N U C light /shape and on ships whistle sound Morse D or U and supplement by light signal.
6) Advice all vessels in vicinity and plot own vessel position and other vessel position.
7) Post extra lookout and keep good watch on passing by traffic.
8) If appropriate broadcast urgency message to vessel in vicinity.
9) If drifting onto lee shore send distress message.
10) Estimate time available before vessel stand in danger.
11) Obtain latest weather report.
12) Stop the ship in case of both emergency and auxiliary steering fails.
13) Decide for anchoring (if depth of water permits.)

Malfunction of navigation equipment:-

Position fixing systems:-

1) Inform master and electrical officer.
2) If operational, use a secondary method to plot position.
3) In coastal water use visual means to plot position
4) Use the echo sounder.
5) If visibility is bad in coastal water increase the distance from the coastline or other obstruction.
6) In open water,obtain position by celestial observation,
7) Reduce speed if required.
8) Call and notify the ship reporting system.
9) Cross check position with other available means.
10) Try to repair the equipment as soon as possible.

Gyro compass:-

1) Inform the master and electrical officer.
2) Inform the engine room.
3) Engage the hand steering and steer by magnetic compass.
4) Establish a rota for hand steering.
5) Once on each watch and after every course alteration calculate compass error.
6) Consider the effect of gyro failure on other navigational aids.

On set of heavy weather:-

At sea:-

1) Inform master.
2) Plot vessel position.
3) Update weather report and make entry in log book every hourly.
4) If required make obligatory report to other vessel in the vicinity and the nearest CRS
5) Check on barometer pressure rate of falling.
6) Check the wind force and wind direction.
7) Predict the low pressure using bouyle ballet law.
8) Steer the vessel with the wind at about 45 deg on the bow the alternate heading is with the wind about 45 deg at quarter.
9) Inform all departments.
10) Secure the deck; close all water tight door, rig life line on deck.
11) Check that all free surfaces is eliminated.
12) Check that stability of vessel is adequate.
13) Take extra lashing on cargo.
14) Consider re-routing and revise E T A.
15) Reduce speed in plenty of time to avoid structural stress on vessel.
16) Alter course to reduce heavy rolling.
17) Adjust speed to reduce pounding affect.
18) If vessel near to coast seek for lee of the land.

In or approaching port or coastal waters, additional action

1) Enquire if the port is open or close
2) If the port is closed proceed toward a sheltered anchorage
3) If along side consider proceeding to sea however as minimum double up mooring and raise the gangway/accommodation ladder.
4) If necessary stop cargo operation.
5) Update weather report.

At anchor additional action:-

1) Heave up the anchor and proceed to sea or pay out more cable or consider coming to an open moor.
2) Use the engine to educe the strain on cable.

Q 10: - explain the hazards and procedure to be followed when navigation in the vicinity of a tropical revolving storm.

Ans:-

Hazards: _

1) Damage to ship and cargo.
2) Uncomfort to crew and passengers.
3) Loss of water tight intrigrity of the ship due to damage.
4) Total loss of ship.

Procedure:-

1) Inform master.
2) Plot vessel position.
3) Check on barometer pressure rate of falling.
4) Check the wind force and wind direction.
5) Predict the T R S bouyle ballet law.
6) Obtain the latest weather report.
7) Check vessel's position with respect to semi circle.
8) Continuous monitor the TRS movements.
9) Inform all departments.

10) Secure the deck; close all water tight door, rig life line on deck.
11) Check that all free surfaces is eliminated.
12) Check that stability of vessel is adequate.
13) Take extra lashing on cargo.
14) Consider re-routing and revise E T A.
15) Reduce speed in plenty of time to avoid structural stress on vessel.
16) Alter course to reduce heavy rolling.
17) Adjust speed to reduce pounding affect.
18) If vessel near to coast seek for lee of the land.

Q 11: - explain the hazards and procedure to be followed when navigating in or near ice.
Ans:-
Procedure:-
Source of information:-

1) Ice charts.
2) Other out bound shipping.
3) Meteorological office (North wood)
4) Daily coast radio (fax charts and weather bulletin).
5) Ocean passage of the world-(world wide met-office advisory.)
6) Mariner handbook.
7) Navtex report. (Swedish ice and finish ice report.)
8) Ocean weather ship (war ship)
9) Local pilot and other harbour control.
10) U S Coast guard, ice patrol distributed by U S ocean office.
11) Sailing direction (Canadian coast guard.)
12) ALRS vol.
13) Routing charts.
14) Weather facsimile charts.
15) International ice patrol.
16) Previous records on board if the vessel had been to the area before.

On encountering ice obligatory report by the master:-

1) The report is to be made by all available means to ship in vicinity and to the nearest coast station.
2) It should be made in English or by INTERCO.
3) If send by radio telegraphy the message should be prefixed by T T T signal.
4) If send by radio telephony then spoken word SECURITY repeated three time in each case.
5) The message control follows
    A. Date and time in G M T of the observer.
    B. Type of the ice observed.
    C. Position of the ice observed.
    D. Concentration and thickness (if known).
    E. Ice Berge, size and shape.

Hazards near the ice:-
Maintenance of navigational accuracy:-

1) Visual fixes could be restricted due to land marks being obscured by snow and reduced visibility.
2) Fog, low cloud ice condition generally poses continual navigational problems.
3) Sights when only the sun is available have to be use with the method of transferred position line and the accuracy of this position line is not reliable.
4) The margin of error for celestial observation in ice area is very high
5) Drift ice is usually unexpected.

6) Ice can not be detected by radar at adequate range.
7) False horizon frequently can be observed on ice because of refraction and mirage.
8) Sights bay not be possible where the horizon is covered with ice or snow

Procedure near the ice:-

1) Update the weather report and collect all information about ice
2) Find out if any drift ice is found in that area.
3) Put engine on stand – by .and reduce speed to safe speed.
4) Engage on manual steering with both steering motor ON.
5) Post extra look out as high and as forward as possible.
6) Master should be on the bridge and take the CON of the vessel.
7) All water tight door and hatch cover should be closed.
8) All fire fighting and life saving equipment should be ready for emergency use.
9) Life line should be rigged on deck.
10) Salt may be sprayed on deck to avoid ice accretion.
11) All ballast tanks and fresh water tanks should not be more then 90%.
12) Vessel must have adequate trim to have the propeller fully immerse in the water the trim should not be excessive.
13) Use canvas to protect rope and wire on mooring drum.

Hazards in the region of ice:-

Maintained of the navigational accuracy;-

1) Visual fixes could be restricted due to land marks being obscured by snow and reduced visibility.
2) Buoys and floating marks may be beneath the ice or removed or out of position in heave ice condition.
3) DR is impracticable because the compass may be unreliable in high latitudes. Because speed is variable when entering or proceeding in heavy ice.
4) Log could be landed or with drawn.
5) Radar analysis is difficult in ice condition.
6) The margin of error for celestial observation in ice area is very high.
7) The use of echo sounder is very essential but the sounding can change abruptly and its reliability in high latitude region is reduced.
8) Since the weather condition may be changed abruptly the position fixing frequencies can not be adhere to.
9) Difficulty to identified geographical feature on radar due to icing.
10) Radar GPS and other navigational equipments are to used with good seaman ship practices and with through understanding of their limitation in their capabilities.
11) Equipments may have maintenance problems.

The performance of the navigational instruments and electronic nav aids:-

1) Radar scanner and GPS aerial may become frozen up.
2) There is possibility of ice accretion on aerials which will reduce the range of the transmitters and weak signal reception/transmission.
3) Magnetic compass becomes unreliable unless it has been swung in the particular area to obtain the deviation card.
4) Compass face plate often becomes obscured with ice crystals making visual bearing difficult.
5) The gyro compass loses its directive capability.
6) The inmarsat equipments are close to their limit and hence there will be frequent loss of signal.

7) GPS position must be treated with high caution.
8) Echo sounder reading may not be accurate as result of high dense sea layer below keel.
9) Radar use as navigational aid limited due to icing on coasting features (topography changes.)
10) Logs can not be used as they have been with drawn to avoid damage.
11) Sextant as NAV aid is practically useless with clouds, fog and horizon being obscured with ice.

Use of floating NAV aid marks:-

1) Many of these floating marks and beacons are removed during the ice season to avoid their loss or damage.
2) Other marks such as spar buoys are pushed beneath the ice and are not visibility for use as navigation aid.
3) Even available buoys are too low at water level due to ice accretion or of little use as NAV aid.
4) Ice accretion makes them a poor radar reflection target.
5) Icing causes discolouration and marks may appear out of colour and shape.

The use of sector light:-

1) The most of this lights fail under ice condition (blow off).
2) Frost or ice on the lens of sectored light is liable to significantly change their visibility sectors.
3) Due to affect of reflection /refraction sector becomes unreliable.
4) Colour lights sometime tend to appear white.
5) The width of the sector light is defused at the boundaries and it becomes difficult demarcated the different sector. Errors may be when used for position fixing.

Precaution:-

In the ice region:-

1) It is preferred to enter during day light hours. Entry by night or in reduced visibility should be avoided. If it is forced to proceed good search lights are to be ready for use.
2) Entry should be planned from lee side as ice is less compacted and there would be less wave action.
3) Entry should be at right angle, at reduced speed and at one of the bights.
4) Engine should be ready for immediate manoeuvre at all time.
5) Once in the ice speed should be increased to maintain head way and control.
6) Ship proceeding very slowly may become beset and at very fast risk damage.
7) Use should be made of lead through the ice.
8) If ice goes under the hull engine revolution should be reduced immediately.
9) Anchoring should be avoided in heavy concentration of ice.
10) In case beset in the ice engine should be kept turning slowly to keep the propeller clear.
11) Ice breaker assistance should be requested immediately.
12) Ice breaker advice should be strickly followed.
13) Proper light and sound signal should be used at all time.
14) If navigating in convoy the convoy sequence should be followed.
15) Navigation marks should not be relied upon.

Q 13: - describe the most appropriate position fixing method to be utilised in various navigational circumstances.

Ans:-

Position fixing methods:-

Open ocean:-

1) **DR fix:** - this method is implied when there is no celestial or electronic aid is available. The run is applied on previous DR and estimated position is marked on chart.
2) **Celestial fix method:** - this method is used with sextant .this method give fix with in 2' radius .this method can only be used when horizon available and clear for fix .if horizon is not clear due to cloud of other reason the fix can not be obtained.
   The reliability of fix depends upon following:-
   a) The heavenly bodies are spread around horizon and angle of cut between should be at least 90 deg.
   b) The altitude of bodies should be between 30-60 deg. But can be taken 20-70deg considered.
   c) At least three stars should be taken preferably four stars should be taken.
   d) Never less then 30 deg in azimuth.
   e) Preferably should be at same altitude. If not stars on opposite horizon should be on same altitude.
3) **GPS fix method:** - the GPS fixes can be obtained through out the period of time as satellite is giving continuous fixes.

Coastal water: - additional to open ocean the following fix will also be available.

Coastal water:-

1) **Visual bearing, range and radar range and bearing observation of terrestrial objects.-**
   a) The object used for visual and radar position fixing should be charted as the bearing or range will have to be plotted on the chart from their symbols.
   b) Objects should be easily identified.
   c) Objects should be well spread to provide good angle of cut between the position line or ranges.
   d) The preferred angle is 90 deg between the two objects and three marks at 60 deg. the angle should be not less then 30 deg.
   e) Object should be observed from the same compass repeater to save time between observations.
   f) It is preferred to select the object that are closer to the ship as any error in the fix due to error in the position line will be less significant over shorter distance.
   g) When ship is in the channel the object should be on the same side of the channel to avoid any error cause by the datum inaccuracies.
   h) Objects in transit line are good option as the bearing is not subject to compass error .in fact the compass error can be determined from a single observation.
   i) The objects should be ahead of the ship rather then astern.
   j) Give the highest priority to position fixing by visual bearing.
   k) Floating objects (like buoys and beacon) should not be used for position fixing unless accuracy of their position has been established.
   l) Allow for error of compass, sextant and other navigational aids/equipments.
   m) The interval between fixes should be pre-agreed and consistent. This help make judgement on the estimated of the vessel in future.

2) **Use of sounding**: - echo sounder can be used to fix the ships approximate position .the actual depth under keel must be calculated when doing so.

3) **Terrestrial radio aids to navigation (LORAN-C**):-it is used as primary means of fixing the position of the ship. It is a hyperbolic position fixing system .it uses a low frequency of 100 kHz and transmits pulses. The system has ground wave range of 800' o 1200' .however high accuracy useful range is only 300' or so from the transmitting stations in the vicinity of the base line. It uses the speed of radio signal to calculate the difference of the distance from the transmitting station. The hyperbola system use two station for each position line, which makes it possible to measure accuracy the time difference between the receipts of the two separate signals. Two line of position is required for the fix. If an other hyperbolic line from measurement of two more station crosses this line of position (LOP) a position can be generated. Accuracy of position is one mile.

4) **Satellite system**.: as explained above

5) **Celestial observation**. - As explained above.

Q 14: - discuss the factors that determine the appropriate interval between fixes.
Ans: - The fix frequency should be set so that ship is not in danger between fixes and to guarantee that avoiding action can be taken to maintain the safety of the ship in case of deviation.
There should be enough time and the sea room from a worst case position to still take avoiding action. Generally use continuous monitoring technique in hazardous area where fixing is a time consuming, but do not treat it as an alternative to position fixing. The following should be considered.

1) **Proximity of hazards**:-if hazards are close to the intended passage, plot position more frequently to take corrective action before the vessel gets too close.
2) **Speed of the ship: -** a fast vessel will cover more distance in a given time then slower one, and may get close to danger more rapidly.
3) **Draught: -** vessel with deeper draught has limited sea room to manoeuvre. Plot position more frequently to ensure that vessel remains with in the intended channel.
4) **Displacement:** - larger displacement means more momentum and such vessel will take time to turn or manoeuvre.
5) **Environmental factor**: - in area where extra ordinary set, drift or leeway is being experience, especially towards the hazard, the fixing frequency should be increased.
6) **Traffic density :-**
7) **Manoeuvring characteristics.**

Q 15: - explain terrestrial position fixing methods for coastal passage including the use of radar.

Ans:-

1) Visual bearing and observation of terrestrial objects.-
    a) Object to identified on the chart and same by visually
    b) Object to be at least two or more with wide spread..
    c) Bearing to be taken simultaneously and correct time to be noted..
    d) Compass error to apply. on the bearings when drawing on the charts.
2) Range and visual observation.-
    -Radar to be tuned properly.
    -Object to identified on the radar and feature matching with the chart while taking the Range.
    -Range scale to be adjusted.
    - Object to identified on the chart and same by visually
    - Object to be at least two or more with wide spread..
    - Bearing to be taken simultaneously and correct time to be noted..
    - Compass error to apply. On the bearings when drawing on the charts

- **Radar range and bearing.**
    - Radar heading to be aligned correctly and EBL VRM also to be aligned.
    - Gyro input to be corrected for any error in radar.
    - shore clear object to be used for bearing and range.

- **Use of sounding.**
    Appropriate range scale to be selected
    Gain to be adjusted
    By passing counter its gives appropriate position with reference to chart

- **Terrestrial radio aids to navigation.**

    Beacons, light houses, sector light to be identified, fixed objected to be identified
    Bearing and range to be properly checked on radar, & error to be eliminated
    Features of the object on the radar screen to be same as on chart

Q 16: - describe the use of system for the continuous monitoring of position including parallel indexing techniques.

Ans: - As a vessel moves on its intended track, fix objects in vicinity appears to be moving in the reciprocal direction of its motion (ground track) this technique provides the radar observer with real time, instant information on the ship's lateral position, relative to the planned track. The information is essential in restricted water with a lot of traffic congestion as frequent courses changes that need to be made can only be done if vessel is operating with in its planned margin of safety. For these reason it is particularly useful during restricted visibility. The following technique is used in parallel indexing.

1) **Cross index range method (CIR)-straight index line**

   This is based upon the lateral distance of the planned track from the selected object. It can be employed at all time when using PI .having identified all the hazards, marked the limiting danger line and tracks. A suitable charted object should be selected. A line parallel to the planned track should be drawn on the inner edge of the selected object and not through it. Maximum margin of safety should be marked on either side or the side with off laying danger. perpendicular distance should be measured from the track to this line .this distance is the cross index range (CIR)distance should also be measured for the margin of safety (MOS).this method can also be used for course alteration

2) **Bearing and range method – straight index line**

   The bearing and range from the way point and the wheel over mark should be determined. The range and bearing from the way point should be marked on the radar display in reverse direction.

3) **Bearing and range method –curved index line**

   Turn with in narrow and congested water are critical and required good monitoring, which can also be achieved through P I technique this can be formed in two ways

   a) Where it is just alteration between two tracks the curve can be plotted on the chart using the manoeuvring information on the turning circle of theship.a suitable object on the inside of the curve should be selected and range and bearing for different change of heading from these object should be plotted .this information can then be transferred to the radar.
   b) Alternatively the ship may be navigating through a narrow channel making frequent course changes and executing curves of different curvature using different helms .in such case the intended position of the ship with in the channel should be marked which depend upon the channel may take the form of curve bearing and range of these point from an object conveniently fixed for indexing should be measured for transfer to radar. This object should be on or close to the centre of curvature of the curve.

4) **Zero cross index range (CIR) –narrow channel technique**

   This method makes use of ground stabilised and relative vectors and is used in area where channels are well marked with beacons or buoys. A single line parallel to the track of the ship is drawn or marked on the radar through the point of origin to act as intended ground track of the ship .relative vector or trails should be selected to detect the cross track tendency. As long as relative vector or trails are parallel to the index line ship ground track is in line with the intended track.

5) **Parallel index technique :**

Parallel index technique provide the radar observer with real time, instant information on ship lateral position relative to the planned track, this information is essential in restricted waters with lots of traffic congestion as frequent course changes that need to be made can only be done when operation, if the vessel is operating with its planned margin in safety, for this reason it is particularly useful during restricted visibility, provided the passage plan made diligently,

Q 17: - out line the principles and operation of electronic charts.
Ans:-
Principle:-
The principle of electronic charts is to provide all relevant information for safe passage planning and all information at one conning point in the wheel house .it provide continue information with the progress of the vessel in all water.
Operation:-the electronic charts are provide in two forms:-

1) **Electronic navigation charts:-**

Electronic navigation charts are vector charts and are complied from a set of individual item or object. Arranged inlayers from the data base. A number of these layers my be added or removed by the operator. ENC allows the interrogation of any subject for the purpose of finding of more detail about it

An ENC can be displayed as a seamless chart. During ECDIS system use, the change over from one chart to the other would generally be automatic, unless the operator loads the chart manually.

The hydro graphic office of induvial government have the responsibility to produce ENCs for their own coastal and inland water using up to date hydro graphic information. Not all government have produced the required ENCs and a major part of the earth is presently not covered by ENCs.

2) **Raster navigation charts:-**

A raster navigational charts are scanned version of the corresponding paper charts .RNC may also be used with ECDIS system where ENC are not available and an appropriate folio of up to date paper charts are available.RNC do not make full use of ECDIS system functionally as a number of functions related to route checking and monitoring can not be performed.

Q18: - out line the principle and operation of electronic navigational aids and position fixing systems.
Ans:-

G P S:-
Principle: - G P S is base upon the measurement of the distance between satellites in orbit and a receiver. These distances are range spheres that intersect at the receiver for calculation of the position .the receiver measure the propagation time of the satellite signal being received. the range measure are not true, but are pseudo-range as they contain receiver clock offset error .the receiver processor can resolve the three range equation to remove the effect of receiver clock offset and provide a 2-D fix or it can resolve four pseudo-range equation to provide a 3-D fix.

Operation:-all transmission from G P S satellite are on pseudo-range noise sequence-modulated frequencies L1, L2 etc in past G P S satellite transmitted on two frequencies L1=1575.42MHZ and L2 =1227.60MHZ but modernisation plan have allowed the use of third frequency from 2005, L5=1176.45 MHZ G P S can provide standard position and precise position is based upon the coarse acquisition code.

D G P S:-

Principle:-

The principle is same as G P S it also works on pseudo-range calculation.

Operation:-

The pseudo-range differential is transmitted to receiver in locality on MF (285-325 KHZ) in RCTM SC 104 format. This is an industry standard for encoding D G P S correction. User wish to receive the D G P S services need to have the equipments for receiving the MF transmission from local beacon as well as the G P S receiver capable of incorporating encoded D G P S correction. The general range of DGPS service is 200mile although some beacons are operating at longer range up to 300 mile. The standard accuracy of DGPS is 2-5 meters.

Echo sounder

Principle and operation:-

An echo sounder works on principle of measurement of the time taken by a sound pulse to return from the sea bed .as the velocity of sound in the sea water is known. This time can be translated in to distance .as the sound pulse has to travel the same distance twice –ship to seabed and to ship again. The depth will be half of this distance and so the echo sounder automatically halves it before it is displayed.

Radar:-

Principle:-the pulses of energy that from the radar beam show as lobe –shaped pattern of radiation .the energy is constricted along the axis of the beam .to enhance detection and improve accuracy; the radar beam has specified horizontal and vertical beam widths, which are reference to arbitrary selection power limit.

The main lobe of the radar beam is composed of a number of separate lobes.

Radar beam energy also experiences absorption and scattering as it passes through the atmosphere .this phenomena is called attenuation and it causes a decrease in echo strength .it is greater at higher frequencies.

Operation: - the radar must be operated at peak operational efficiency; although it will still have limitation .the range scale should be selected as per the navigable area and navigator requirement. Long range scanning can be obtained for early warning of targets.

Q 19: - detail the precaution to be observed when using continuous monitoring system including parallel indexing.

Ans: - The use of continuous monitoring is to plot the vessel position before it come too close to danger.

Precaution with parallel indexing:- to effectively use parallel indexing for monitoring the ship's progress after carefully preparing a plan precaution must be observed.:-

1) The radar should be set up properly presenting a picture of good quality and displaying the required echo effectively. Control setting should allow for the optimum picture.
2) Suppression controls, like rain and sea control should be minimised and they should be turned off when not required. time base must be accurately centred
3) The radar should be checked for range, bearing, heading marker and picture rotate accuracy.
4) The compass error need to be known and heading marker carefully aligned.

5) The choice of navigational set up depends upon the area of operation. North-up relative motion would be preferable in coastal water, whereas north-up true motion would be good choice in narrow.
6) The selected object should produce good radar echo .prefer choice would be steep sided, radar conspicuous marks,e.g head land ,isolated rock, isolated beacons and navigational marks with RACON .
7) Object should be selected on both side of ship's track to minimise the error in range plotting marks identification and radar linearity error.
8) Low laying objects and coast line should not be used e.g. sand dunes; tidal low coast line .etc .object should be correctly identified.
9) The selected object should not be obscured from the radar scanner by the presence of other objects.
10) Consideration should be given to radar blind and shadow sector and the length of the time the selected object is likely to remain with in these sectors.
11) Range scale is an important factor, particularly when it needs to be changed.
12) At given time not more then two set of parallel index line be on the radar display. One currently in use and the other for use immediately after the present set.

Parallel indexing does not relieve the navigator of the responsibility to plot position at the predetermined intervals.

Q 20: - explain the limitation and precaution to be taken when using electronic charts.

Ans

Limitation:-

Electronic navigation charts:-

1) The symbol and colour use do not necessarily match across paper charts and ENCs .colour would be different for day and night display.
2) When the scale of the chart is changed on an ECDIS system ,the size of symbol will not change .this may cause problems when working on smaller scales as some object from the lower layer may be hidden under object on the upper layer.
3) Too many layers may hide data or clutter the display, especially on a smaller scale.
4) De-layering may remove data that could be of significance to safe navigation.
5) Objector data could be hidden behind over laid radar/ARPA or AIS data.
6) The alarm will only activate against set parameter .if they have been set incorrectly, alarm may not activate in enough time to take avoiding action.

Raster navigation charts: _

1) The raster navigation charts can only be used in conjunction with an appropriate portfolio of up to date paper charts.
2) With RNC use, automatic alarm will not be triggered. Some user- inserted information can generate alarm e.g. ship safety contour lines, clearing lines, danger area, etc.
3) In congested water the accuracy of the chart data may be less then that of position –fixing system used for ECDIS system.
4) The horizontal chart datum maybe different to that of the position fixing system. the datum may also differ between RNCs
5) RNCs are not seamless.
6) The RNC should be displayed on the scale of the paper chart. An increase or decrease in scale by excessive zooming –in or zooming-out can seriously degrade the quality of the display, as the size of the chart features changes with the scale.
7) Without selecting different scale, the look ahead capability may be limited. The determination of the range and bearing of distance object may be more difficult.

8) The colour display may not be the same as on paper charts and may be different for the day and night display.
9) Chart feature can not be removed or simplified to meet specific navigational situation.
10) Interrogation of the charted feature may not be possible and additional information about them can not be obtained.
11) Orientation of the display other then chart-up may make it difficult to interpret chart symbol and read text.

Precaution:-

1) The operator should be fully familiarised and trained in the use of equipment, as per the manufacturer instruction.
2) The chart supply and correction arrangement should remain active.
3) The back-up system and an alternate power supply should be checked and tested regularly.
4) The position display by the ECDIS system is only as good as that of the input system and over reliance should be avoided
5) The position displayed should be cross checked using the monitoring tools of the ECDIS system to confirm integrity of all systems.
6) Unnecessary overlay of external data should be avoided.

Q 21: - explain the limitation and precaution to be taken when using electronic navigational aids and position fixing systems.

Ans:-

1) Radar

Limitation:

1) Heading Marker alignment
2) Electronic bearing line (EBL) not aligned
3) Gyro input with errors
4) Improper tuning
5) Selection of improper range
6) Blind sector with respect to position of scanner
7) Own vessel DATA incorrect (i.e. Course, Speed)
8) Error in time of plot(Human error , lack of concentration)
9) Error due to adjustment of Rain Clutter, sea clutter & Gain,

Precaution:-

1) Performance test to be carried out
2) Radar to be proper tuned
3) Appropriate range scale to be used
4) Proper adjustment of gain, sea & rain clutter
5) Speed input should be speed over water for collision avoidance

2) Echo sounder

Limitation

1) Scale adjustment
2) Draft adjustment
3) Zero marker adjustment

Precaution:

1) Scale adjustment
2) Draft adjustment
3) Zero marker adjustment
4) Not to be used on stern propulsion
5) Sounding to used with caution when vessel is transiting in ice reasons

3) GPS

Limitation:

1) Datum
2) Height of antenna
3) Power input
4) Availibity of satellite

Precaution

1) Datum to be checked with reference to chart in use
2) Alternative position fixing method to use & counter check with Gps position
3) GPS Signals to be verified with reference to the number of satellite available

4) DGPS

Limitation

1) Available in selected area.
2) Final correction applied by shore station.
3) Cover only small region up to 200 mile from the transmitting station.

Precaution:-

1) Range from the transmitter to be with in limit.
2) Keep separate check on DR and estimated position after every fix base on course and speed taking in to account the expected set and drift.
3) Different between the WGS-84 datum and chart datum must be applied as per the note on the chart.

5) ECDIS

Limitation:-

1) Back up system both hard ware and soft ware need to be carried.
2) Occasionally look ahead facility occupying working screen and displaying large area in small screen.
3) Hardware Failure
4) Software failure
5) Power failure
6) Failure to update charts correctly
7) Input failure
8) Virus infection
9) Operator error through lack of training and /or familiarisation
10) Ship are still obliged to carry paper charts as well at the present time and companies are reluctant to pay double costs for double systems

Precaution:

1) The operator should be fully familiarise & trained the use of equipment as per the manufacture instructions
2) The chart supply and correction arrangement should remain active
3) The back up system and alternative power supply should be check & tested regularly
4) The position displayed by ECDIS system is only as good as that of the input system and over reliance should be avoided
5) The position displayed should be cross checked the monitoring tools of the ECDIS system to conform integrity of all system
6) Unnecessary overlay of external data should be avoided

6) Loran-C

Limitation

1) Cover only in Northern hemisphere
2) Limited Range
3) Terrestrials radio signals are having varying accuracy time of day, time of year and at longer range, interfering for sky waves
4) Small angle between line of position can deteriorate the quality of fix

Precaution

1) Two line of position are require for fix

Q 22: - describe the requirement of current national and international regulations navigation, collision avoidance, radio, navigational equipment

Ans:-

International & National requirements: - the IMO convention is international requirements such as SOLAS, STCW 78/95, COLREGS-72 and ISM code.

Knowledge of current international and flag state requirement and methods of complying with then are important to compliance with ISM code, whether it involves navigation, collision avoidance, navigational equipment or radio & communication, in a few basics apply in all cases,

1) Equipment must be approved as per requirement
2) Equipment must be sufficient with no as per requirements
3) Personal must be familiar with & trained on the use of all equipments
4) Personnel must have full knowledge of procedure to be followed
5) Records must be maintained for specified period
6) Check lists must be regularly reviewed
7) Valid documents must be available at all time
8) Crew must have ability to communicate clearly
9) Risk assessment principle & technique should be completed for all identified list
10) Regular assessment & monitor should be carried out
11) The SMS should not be at variance with the law
12) Though the company may choose to make their own requirement the more stringent for added safety.

Q 23: - outline the requirement of current MSN, MGNand MIN with respect to navigation, collision avoidance, radio, Navigation equipments.

Ans: - IMO convention may either be adopted by the flag state to form its own law.
Alternately the flag state may produce legislation that fulfil the requirements of the relevant I M O convention and also enhance them.
In addition the flag state may provide guidance in the form of code or guidance notices related to the specific area.
This will happen when:-

1) When new legislation is introduced.
2) When an enquiry in to accident has indentified poor practice.
3) When there is issue involving safety and pollution prevention.
4) When the industry has to be notified of change.

The flag state administration may also issue notices. The UK MCA issue notices in three series.

Mariner's guidance note. **(M G N)**

1) Are blue.
2) Provide guidance and advice to relevant parties in order to improve the safety of shipping and life at sea and pollution prevention
3) Are numbered in sequence from M G N – 1

Mariner's information note. (M I N)

1) Are green.
2) Provide information for more limited audience/readers e.g.:- training establishments, equipments manufacturers, or which will be used for a short period of time.
3) Have a fix cancellation date which usually 12 month after publication.
4) Are numbered in sequence M I N – 1

Merchant shipping notice (M S N)

1) Are white.
2) Are used only to convey mandatory information which must be complied with under U K legislation.
3) Relate to statuary instruments and contain technical detail of regulation
4) Are numbered in sequence
5) Continuous the sequence in use prior 11th march 1997 but with prefix M S N and are related to publication such as COSWP , LSA Regulation and SOLAS.

Q 24: - describe the requirement of the ISM Code with respect to, navigation, collision avoidance, radio, Navigational equipments.

Ans:

Requirements:-

1) Equipment must be approved as per requirement.
2) Equipment s must be sufficient number as per the requirement.
3) Personal must be familiar with and trained on the use of all equipments.
4) Personal must have full knowledge of the procedures to be followed.
5) Proper records whether they are automatic or human interface must be maintained.
6) Records must be maintained for the specified period.
7) Checklist must be regularly reviewed.
8) Valid document must be available at all the time.
9) Crew must have the ability to communicate clearly.
10) Risk assessment principles and technique should be completed for all indentified risks.
11) Regular assessment and monitoring should be carried out.
12) The SMS should not be at variance with the law though the company may choose to make their own requirements more stringent for added safety.

Q 25: - explain the principles to be observed in maintaining a safe navigational watch.

Ans:

To clearly eliminate the principle of safe navigation water the following factors of navigational risk assessment to be considered.

a. Identify the hazards.
b. Consider the potential harm
c. Evaluate the risk, establish of existing precautions are sufficient.
d. Record of all finding and measure of control.
e. Review the assessment and if the risks are still not controlled. Revise the plan until you read a satisfactory conclusion.

After risk assessment the following principle to be observed.

1. Frequently changes in symbols /legends or abbreviations used on chart or on passage plan should be avoided as it leads to confusion.
2. Advance warning on system on chart and in passage plan sheet should be made adequate.eg; next chart no, high traffic density, fishing ground, crossing traffic, shallow water, no go areas etc.
3. Courses should be plotted on large scale charts clear of predicted area of danger all0wing for margin of safety as determined by local, company regulations and master instructions.
4. Contingency plan should be made in advance, in case of emergency eg; engine failure, steering failure etc.
5. Wheel over points should be marked .from clearly identifiable, conspicuous shore objects/radar targets.
6. Where visual means of position fix is available the GPS should be secondary means.
7. When transferring position and course between charts range and bearings from fixed objects must be used.
8. Points of no return should be determined before entering narrow channel, riverbars, with critical height of tide.
9. Sequence of charts should be in order.
10. PI line along with PI distance should be marked.
11. All voyage charts and publications should be update to latest corrections onboard.

Q 26: - describe the factor to be considered when determining the composition of bridge team.

Ans:-

When deciding on the composition of bridge watch which may include appropriate qualified rating, this factor must be considered:-

1) The bridge must not be left unattended at any time.
2) Day light/darkness, visibility and weather condition.
3) Need for OOW to carry out additional duties in proximity to navigational hazards.
4) Use and operational condition of navigational aids (such as Radar or Electronic position indicating devices) and any other equipment affecting the safe navigation of the ship.
5) If the ship is fitted with autopilot.
6) The need to perform Radio duties.
7) Unattended machinery space (UMS) controls, alarms, and indicators provided on the bridge, procedures for their use and any limitations they may have.
8) Any unusual demands on the navigational watch that may be arise as a result of special operational circumstances.

Q 27: - explain the organisational requirements with respect to the bridge team to allow for varying navigational situations and taking into account fatique of personal.

Ans:-

Organisational requirements:-the STCW 95 code advice Governments to set up a maximum blood alcohol level of 0.08% for ship's personal duty watch keeping and to prohibit a consumption of alcohol within 4 hours of starting of watch. Some companies, flag state administration and port state may exercise more stringent policies.

Fatique personal:-the STCW 95 code has laid down regulation for mandatory rest period for members of bridge team in order to prevent stipulated that:-

1) Rest period of at least 10 hours in any 24 hours period are required.
2) If rest is taken in two periods, one of those periods must be at least 6 hours.
3) The minimum period of 10 hour may be reduced to not less then 6 hour consecutive hours provided that any such reduction does not extend beyond two days and that not less then 70
4) Hours (in case of UK 77 hours) rest is provided during each seven days periods.

Q 28: - explain the requirements and procedures to be included in standing and night orders

Ans:-

Requirements:-

Shipping is governments by various convention, codes and guide lines at national and international level. These provide the frame work with in which the officer's duties are performer in routine and some time extra ordinary circumstances.

The owner's SMS provide operational procedures that will be based on the owner's navigational policy. These should work with out conflict with in the SMS and apply to every ship.

Standing orders:-

The company may have standing order for navigation; however the master should provide his own standing order to explain requirements to the officers. These can be from master's previous experience and lessons. The standing order will be supplemented on a daily basis by night orders This order sets the general standard required of the watch keeper. The standing order will reflect:-

a) Type of the ship.
b) Her trading patron.
c) Personal performing the bridge team and their experiences.
d) These are specific to the ship and her crews.

The purpose of standing order;-

1) To lay down ground rule for the master 's expectation of his officers in varying circumstances
2) To reinforce practices that the master expect to be followed.
3) To create a relation ship in which mutual confidence is established.
4) To increase the responsibility of the officer with out imposing limitation.
5) To ensure that a mistake of one person does not put the vessel in danger.
6) For the officer to check their own work and verify that of others when handing over or taking over the watch. This should apply to time under pilot age.
7) The officer will know when the master expected to be called and the master know that the OOW will follow his instruction.
8) A copy is sent to owner for their retention.

Night order:-

1) These are specific instruction to watch keeping officer in a given situation and are supplementary to standing order.
2) They cover periods when the master would be absent from the bridge at night.
3) This instruction will allow the OOW to take action to ensure safety of the ship and allow sufficient time for the master to take command of the vessel.
4) It must be understood that these instruction are to increase the responsibility of OOW and are not meant to impose limitation.
5) This instruction will be based upon the master's knowledge and experience .that would allow the passage plan and general navigational duties to be performed.
6) Details of time to serve various notices, call crew, call the master, send or receive message are common examples.
7) Operational circumstance during the night are also covered under these orded (for examples:- any on gang operation)
8) Night order would give courser, manned/UMS, clock changed, any that was going on such as fire pump under repair, cargo ventilation, gas freeing, hatch lid or doors that are deliberately left open .it may also include handling of the vessel during heavy weather or other hazardous situation.
9) Each OOW should sign the night order book and should be maintained as important records of onboard events.

Q 29: - explain the bridge procedure to be followed

a) **prior to arrival in the port**
b) **before sailing**
c) **Approaching area of high density or navigational hazards.**
d) **When navigating in reduced visibility.**
e) **When handing over navigational watch.**
f) **Daily whilst at sea.**

Ans:-

Prior to arrival in port:-

1) Readiness of the ship's machinery and gears.
2) Control testing. Any defects should be rectified.
3) Anchor cleared and ready for use, mooring ropes on deck.
4) Obtain coastal and local warning and local weather forecast.
5) Set up NAVTEX for appropriate station.
6) Notice to engine room and crew at appropriate stage.
7) Book the pilot.
8) Obtain berthing details and prospects.
9) Arrival draught calculation.
10) Tidal data particularly of high water.
11) Ship stability.
12) Passage plan finalised and bridge preparation. Carry out set of navigational equipments.
13) Crew and passengers list.
14) Declaration of health, custom and immigration.
15) Positive reporting by concern departments regarding readiness.
16) Search for stowaway, terrorist devices and contraband.

Prior to departure from port:-

1) Water tight intigrity of the ship.
2) Readiness of ship' machinery and gear.
3) Availability of bunker and store for the voyage.
4) Control testing. Any defect should be rectified.
5) Crew available and readiness.
6) Security of cargo and stores.
7) Booking of pilot and tugs.
8) Draught and free board.
9) Tidal data, particular of high water.
10) Ship stability.
11) Obtain NAVAREA, coastal and local warning as well as weather forecast.
12) Passage plan finalised and bridge preparation. Carry out set up of the navigational equipments.
13) Crew and passengers list.
14) Positive report by concern departments regarding readiness.
15) Search and stowaway, terrorist devices, and contrabands.

Approaching area of high density or navigational hazards:-

1) Assess the situation vessel is going to encounter
2) Determine the risk of that area
3) Make all preparation on board.
4) Inform the master and engine room regarding requirements of engine.
5) Up date weather report.
6) Make sure that large scale charts are being used.
7) Post extra look out and engage on hand steering.
8) Put engine on stand-by.

When navigating in reduced visibility: - when restricted visibility is encountered or expected, fist responsibility of officer is to comply with COLREGS rule No.19.

1) SBE
2) Advice engine room of restricted visibility and that it is to be manned till further notice.
3) Reduce to safe speed
4) Inform the master.
5) Engage hand steering and post a helms man
6) Post extra look out.
7) Sound appropriate sound signal.
8) Switch ON navigational lights.
9) Keep on Radar at peak performance and commence systematic plotting of all targets in the vicinity.
10) Plot position frequently.
11) Obtain a visual fix before entering restricted visibility.
12) Employ parallel indexing technique.
13) Run the echo sounder.
14) Have anchor ready for letting go.
15) Close all water tight doors and hatches.
16) Order silence on deck.
17) Open bridge wing doors.
18) Run both steering motors.
19) Keep a check on all bridge equipments.
20) Radar plotting for collision avoidance should be on water track speed.
21) Do not use VHF / AIS data for collision avoidance.
22) Comply with the provision of COLREGS in particular rule 19
23) Bridge manning to meet the manning levels/restricted visibility.

When handing over navigational watch:-

The following factor should be considered:-

1) Not hand over watch to the relieving officer if there is reason to believe that the taking over officer is not capable of carrying out the watch keeping duties effectively, in which case the master should be notified.
2) Ensure the members of the relieving watch are fully capable of performing their duties.
3) Ensure relieving officer and member's vision is fully adjusted to the light conditions.
4) Ensure that standing orders and the master's night orders are fully understood and complied with.
5) Not hand over the watch when manoeuvre is in progress until such action has been completed.

Taking over watch:-

The relieving officer shall:-

1) Prior to take over watch verify the ship's position estimated or true position.
2) Confirm the ship's intended track, course and speed.
3) Note any dangers to navigation expected to be encountered during the watch.
4) Be aware of prevailing and predicted tide, currents, weather, visibility, and the effect of these factors upon course and speed.
5) Note any error in gyro and magnetic compasses.
6) Note the status of all bridge equipments.
7) Note the setting of bridge/engine controls and manning of engine room.
8) Be aware of the presence and movements of the ships in sight or known to be in the vicinity.
9) Give watch keeping personal all appropriate instructions and information which will ensure the keeping safe navigational watch including maintenance of proper look out.

Daily whilst at sea; - comply with COLRES ay all time

1) Check vessel position at regular interval so that vessel does not stand in danger.
2) Check navigational equipment operational status (should be satisfied)
3) Check radio equipments and carry out daily test.
4) Up date weather report as and when available.
5) Check compass error once in watch and or when there is large alteration of course.
6) Up date Noon report to company and charter party.
7) Change steering on hand once in each watch.
8) Comply with master's standing and Night orders.

Q 30: - details the information to be exchanged between the master and pilot in accordance with current guidance.

Ans:-

Reason for using the pilot:

1) Local regulation and legal requirements.
2) Navigation in restricted and congested water.
3) Local knowledge.
4) Assistance with ship's handling and working with tugs.
5) Communication with shore,VTS,Tugs,mooring boats, mooring gangs,
6) Up to date information of local hazards.
7) Correct knowledge of local hydro graphic details.
8) Detailed information of natural elements.
9) Latest weather forecast.

The following information is to be send to pilot age authority before the pilot board:-

1) Ship' ID
2) Name, call sign, flag, agent, IMO No., ship type, year built last port.
3) Communication information-fax, telex, VHF Channel.
4) Pilot boarding- ETA, free board, station.
5) Ship's particulars,
6) Draught, air draught, LOA, Beam, displacement, DWT Summer, GRT, NRT.
7) Anchors and length of cable.
8) Manoeuvring details. And current condition.

9) Speed- minimum steerage speed, propeller – CPP, thruster's rudder, hard over to hard over.
10) Main engine.
11) Type power, maximum NO. of power start, time full ahead to full astern
12) Equipments defects (safe navigation)

When pilot boards: - the master will pass following information to the plot. The master will give all information as per pilot card which will be given to pilot on boarding the vessel.

1) Course.
2) Speed.
3) Engine telegraphs setting.
4) Critical RPM.
5) Time required from full ahead to full astern.
6) Draught.
7) Anchors and length of cable.
8) Mooring winches and their position.
9) Safety information: life jacket, and location of LSA

From pilot to master:-

1) To provide with all local and relevant information regarding the pilot age period.
2) Advise the master of local by-law effecting navigation.
3) To provide his identification and authorisation.
4) Intended passage plan.
5) To investigate the passage plan and make recommendation effecting the safe passage.
6) To advise he masters on over all navigation details.
7) No. of tugs available. And their bollard pulls.
8) Mooring arrangement required.
9) Tugs position wrt vessel.
10) Reporting point on passage.
11) Current and wind effecting in pilotage.
12) Height of tide and if any danger or wreck on passage.

Q 31: - explain the requirement to be ensured the adequacy of an engineering watch at different stages of passage.

Ans;-watch arrangements in engine room will depend upon whether the ship is UMS classified or not. On UMS classified ship the engine room is unattended at night. For ship which is not UMS classifier round the clock watches are maintained. The master need to ensure that adequate watches are being maintained in the engine room.
The following factor should be considers to adequacy of engine room watch:-

1) Open sea: - UMS – engineer on routine maintenance and attending to alarms.
2) Coast-light traffic: - UMS- engineer on routine maintenance and attending to alarms.
3) Coast-heavy traffic: - Engine watch – duty engineer in engine room.
4) Restricted visibility: - SBE- duty engineer in engine room.
5) Approaches channel: - SBE- senior engineer and junior engineer and engine rating.
6) Pilotage water: - SBE – senior engineer and junior engineer and engine rating.

Q 32: - outline the consideration to be taken when leading or participating in Search and Rescue operation.

Ans:-

When leading:-

1) The experience and training of the master of the vessel.
2) The communication facility of the vessel including language.
3) Qualified staff onboard the vessel.
4) The amount of the time the vessel can spend on the scene
5) Location/proximity of the vessel with relation to the search and rescue area.
6) The nature of the work being carried out and the work load.

When participating

The following to be prepared on board: _

Bridge /navigation

1) Brief and advice watch office and look out s.
2) Up-to-date weather information for the route and the distress position.
3) Determine datum and update it as necessary.
4) Operate radar (s) especially (x) band 3cm
5) Call or designate a communication officer.
6) Make sure binoculars are available.
7) Plot the position of own ship frequently to maintain the quickest route to the scene .make course adjustment as necessary.
8) Plot the position of other ships attending the distress call.
9) Consider using search or deck lights during hours of darkness.

Communication:-

1) Monitor all distress frequencies.
2) Try to maintain continuous contact with the ship in distress.
3) Update CRS/ RCC with any developments and obtain current information's from the service.
4) Have copy of INTERCO ready.
5) Locate day light signalling lamp search light, flash light, hand held VHF radio and loud hailer.
6) Establish communication with emergency /deck (rescue) team.

Engine room:-

1) Advise to maintain maximum possible speed.
2) Advise when the engine are to be on stand-by and ready for manoeuvring
3) Order other services in good time e.g. fire pump, power for deck machinery etc.

Deck:-

1) Prepare rescue boat for launching subject to weather condition.
2) Have life raft ready and consider using it if required as a boarding station.
3) Rig scrambling net on both side of the ship.
4) Rig rope ladder on both side of the ship.
5) Have life jacket and life buoys in readiness.
6) Have heaving line, rescue quoits, line throwing apparatus and messenger rope in ready.
7) Rig man rope on both sides.
8) Check cargo lifting appliances (crane, derrick gantry etc) on each side of the ship, with cargo net and spreaders for recovery of survivor.

Medical assistance:-

1) Stretcher.
2) Blankets.
3) Medical supplies, first aid kit, resuscitator and medicine.
4) Dry clothing.
5) Food and hot drink.
6) Hospital.
7) Shelter.

Q 33: - explain the procedures when working with helicopters and small craft.
Ans:-
Helicopter:-

Bridge:-when possible the ship must maintain steady course as directed by the helicopter pilot. General guidance is based upon the ship board operating area.
The helicopter usually approach from the port side of the ship. The ship should maintain relative wind as follow:-

1) Port- 30 deg on port bow
2) Midship- 30 deg on port bow or on either beam.
3) Forward- 30 deg on starboard quarter.
4) When this is not possible the ship should remain stationary keeping its head in to the wind .No attempt should be made to provide lee.
5) The sea area for operation should be selected care fully. It should be clear of navigational hazards and other shipping.
6) The course and speed should be agreed with helicopter pilot in advance.
7) Early communication should be established with helicopter. To identify the ship.
8) Position, heading, ETA, name, description, colour of ship's hull, special features, and transmission of homing signal can assist the helicopter pilot the to identify the ship.
9) Display the wind soak at clear area at operation for helicopter pilot to know the wind direction.
10) Inter national code of signal should be ready for use.
11) Restricted in her ability to manoeuvre signal (RAM) should be displayed.
12) All bridge team briefed before operation.
13) Master must take the con of the vessel.
14) The engine should be on stand-by and wheel on hand steering.
15) No line throwing apparatus or pyrotechnic should be used in vicinity of helicopter.
16) No power beam light should be directed towards helicopter. As it impaired the vision of helicopter pilot.

Deck:-

1) The winching or landing area should be clear; the yellow marking should be enhanced.
2) Upper part of the any obstruction should be conspicuously painted.
3) All aerial and stays in the area should be struck.
4) Obstruction that can not be lowered should be well illuminated at night.
5) Rail etc should be lowered or removed.
6) All loose items should be removed from the area or secured firmly.
7) The emergency and rescue party should be ready with the rescue boat.
8) Safety and fire fighting appliances should be ready at the place of operation.

Small craft: - (smallboat, tug, pilot boats, harbour launch.)
Procedure:-

1) Establish and conform communications.
2) Rendezvous position clear of obstruction of traffic.
3) Conform command authority.
4) Negotiate forward passage plan.
5) Manual steering engage in ample time.
6) Visual connect maintained once established.
7) Clarify engagement detail.ie such as rope leads, operational speed.
8) Charts inspection. For UKC squat and interaction...
9) Inform engine room.
10) Up date all interested parties.
11) Log activities and monitor position and weather reports.
12) Maintain effective look out. Monitor current and interaction. Look out and radar watches.
13) Monitor ship's position continuously.
14) Obtain revise weather information prior to engagements.
15) Display appropriate signal.
16) Instruments checks and stern propulsion.

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