

Chief Mate Phase 1 Syllabus

Navigation

Practical Navigation

- Describe ocean passages for the world and sailing directions.
- Routeing charts and routeing in accordance with general provisions of ship's routeing.
- Reporting procedures in accordance with general principles for ships reporting system and with VTS procedures.
- Planning navigation and plotting courses taken into account restricted waters, meteorological conditions, Ice, Restricted visibility, Traffic Separation Scheme, vessel traffic services (VTS) areas and areas of extensive tidal effects.
- Explain various stages of passage planning (Appraisal, Planning, Execution and Monitoring)
- Define Current, Leeway, Tidal stream, Set, Drift.
- Explain effect of wind and current and determine course and distance made good.
- Explain course to steer allowing for tidal stream or current or wind.
- Explain how to determine distance off by Vertical Sextant Angle.
- Determine position by bearing and range (Exercise).
- Determine position by plotting astronomical position lines (Exercise).
- Transferring of position lines (Exercise).
- Determine position by running fix with leeway and current (Exercise).
- Plan a passage between two ports from berth to berth using the procedure for passage planning (Exercise).
- Ability to use appropriate charts, publications, errors in position lines and notice to mariners.
- Explain how errors may occur in position fixing and how they are minimized.
- Chart correction and other nautical publications including T&P notices using Notice to Mariners and corrections using tracings (Exercise).
- Mercator Sailing (Exercise).
- Explain Spherical triangle, Napier's Rule, how to transfer GC course to Mercator chart.
- Describe Gnomonic, Mercator, Transverse Mercator and Universal Transverse Mercator Projections.
- Calculate Position of vertex of GC track, Initial course, Final course and distance with the stated limiting latitude.

Celestial Navigation

- State Kepler's Laws of motion.
- Define civil, nautical and astronomical twilights.
- Explain conditions necessary for twilight all nights, continuous day light or continuous darkness.
- Explain influence of latitude on duration of twilight.
- Explain relationship between time and longitude.
- Explain relationship between time and hour angle.
- Explain magnitude of stars.
- Explain how to identify stars by star charts and star finder.
- Calculate Time of meridian altitude of sun.
- Calculate position lines by means of observation of sun, planet and stars including pole stars.
- Calculate stars suitable for observation in the twilight period.
- Calculate position based on staggered / simultaneous observations.

Meteorology

- Explain diurnal variation of temperature, relative humidity, Lapse rate, adiabatic change, Diurnal variation of pressure, geostrophic wind, Gradient and cyclostrophic winds.
- Describe Characteristics and location of doldrums, ITCZ, Trade winds, Westerlies, polar easterlies, and sub-tropical oceanic highs.
- Explain general description of surface temperature and surface current.
- Describe characteristic and weather associated with various types of clouds, characteristic and weather associated with various air masses, cause of global warming.
- Depletion of ozone layer, Accumulation of greenhouse gas.
- Describe effect of global warming - change in weather pattern, melting of ice cap.
- Explain region and seasons of greatest frequency of TRS.
- Explain local nomenclature of TRS.
- Explain Condition associated with formation of TRS.
- Explain factors affecting movement of TRS.
- Explain factors associated with decay of TRS.
- Describe characteristics of TRS.
- Describe signs which give warning of an approaching TRS.
- Describe messages required to be sent as per SOLAS.
- Sketch and describe typical and possible track of TRS.
- Sketch and describe cross section through a TRS showing areas of cloud and precipitation.
- Sketch and describe plan of TRS showing isobars, wind circulation, track, path, eye, trough line, dangerous semi-circle, dangerous quadrant and navigable semi-circle for both hemispheres.
- Explain reason for naming dangerous hemi circles.
- Explain Method determining in which sector of TRS a ship is situated.
- Explain method of determining vertex of a TRS.
- Explain Correct avoidance procedure when in the vicinity of TRS.

- Define family of depressions, trough, anti-cyclone, ridge, col
- Sketch and describe structure of typical frontal zone, warm front, cold front, line squall.
- Explain frontogenesis, frontolysis, Occlusion, weather associated with cold front, warm front, line squall and ITCZ, formation of frontal and non frontal depressions.
- Sketch and Describe distribution of weather in a depression, isobars and wind circulation in a depression, cross section through warm and cold occlusions, synoptic pattern of anti-cyclone, synoptic pattern of ridge, synoptic pattern of col.
- Explain synoptic and prognostic charts along with their use, interpreting isobaric patterns and codes on a synoptic weather chart.
- How to determine geostrophic and surface wind speed from the charts.
- Explain purpose of maritime forecast code.
- Explain data given by MARFOR.
- List information given in wave chart, ice chart, weather fax charts and shipping forecasts.
- Explain drift current, gradient current, upwelling current.
- Explain general patterns of surface water circulation, principle individual currents and their names.
- Explain information available on current rose.
- Explain vector mean current, current data present in current atlases and routeing charts.
- Describe use of data available from all of above for passage plan.
- Describe Characteristic and weather associated with various ocean currents.
- Define wave, significant wave height, average wave height, fetch, swell.
- Explain importance of wind forces, duration, fetch in formation and growth of waves, the method of estimating wave height and wave period, factors affecting wave height and direction, informations available from wind rose, the method of estimating wave length of the wave.
- Define ice tongue, ice shelf, pack ice and fast ice.
- Explain formation of sea ice, formation of ice bergs from floating glaciers, ice shelf's and characteristics of each.
- Explain normal season and probable tracks of bergs from origin to decay (North Atlantic Only), outer limit of area in which ice bergs may be encountered.
- Explain reason for decay of ice bergs, areas affected by sea ice, Precautions to be taken when navigating near ice.
- Explain purpose, duties, and responsibilities of International ice petrol, freezing spray and actions to minimize the effect.
- State signs which may indicate proximity of ice on clear days and nights, the range at which observer may expect ice visually in varying conditions of visibility.
- State limitations of radar as a means of detecting ice.
- Describe factors which may give rise to ice accretion, use of mariners hand book to estimate the rate of ice accretion, method of reducing ice accretion, report to be made under international conventions when ice is encountered.
- List informations in radio messages reporting dangerous ice, conditions leading to ice accretion.
- List different types of ice, ice bergs, limits of ice bergs, accumulation of ice on ships.
- Describe information of current, wind and ice to select an optimum route, use of wave chart to select the best route, weather routeing services available to shipping.
- Describe climatological routeing, optimum (least time routeing), data presented in sailing directions and mariner's hand book, construction of ship's performance curves.
- Explain routeing charts, tide tables, current and tidal stream atlases.

Cargo Handling & Stowage

Dry cargo

Timber Cargo

- Explain contents of code of safe practice for ships carrying timber deck cargoes, stowage and securing of deck timber cargoes.
- Explain hazards involved with the carriage of deck timber cargo, need for regular inspection of lashing arrangements.
- Explain need for controlling height of deck cargo, need for provision of walkways and access to the top of the cargo.
- Describe action if cargo is lost overboard, stability criteria to be fulfilled, rolling period test for determining ship's stability and limitations of the method.

Container

- Explain types and marking of containers, bay plans and stack weight, anti-heeling tanks, torsional stress, lashing and securing of containers, container code.
- Describe procedures for loading and carriage of refrigerated containers.

Car carriers and Ro-Ro Ships

- Describe stowage and arrangements of vehicles, procedures for loading and discharging of vehicles, procedure for lowering and hoisting of ramps, procedure for setting up and stowing retractable vehicle deck.
- Describe procedure for opening and closing and securing hull openings, general precautions to be observed whilst working cargo.
- Explain need to monitor atmosphere in ro-ro space.

Reefer ships

- Define cooled, frozen and chilled cargoes.
- Describe general outline of refrigeration system (vapour absorption and brine cooling), preparation of cargo space for carriage of refrigerated cargoes.
- Describe Care, monitoring and records of cargo during voyage, Inspection of cargo and brine traps, general precautions to be observed whilst working cargo.

- Explain load density, need for spreading of the load over an area, use of shoring, hazards and precautions while handling a heavy lift, method of securing heavy lift(below deck and above deck), need for adequate initial GM.
- Describe Mate's receipt, Bill of lading, Charter parties, note of protest.
- Prepare cargo plan given hatch dimension, stowage factor, load density, broken stowage.
- Describe prepare cargo space prior loading, precautions to avoid crushing and chafing damage and state which cargoes are liable to be affected, how to protect cargoes which liable to freeze.
- Describe Ship and Cargo sweat and need for ventilation, importance of and information available from code of safe practice for cargo stowage and securing, importance of and information available from cargo securing manual.
- Describe securing arrangements of rolled steel, steel coils, steel plates, vehicle, containers, inspection and lightening of lashings, importance of log book entries.
- Define competent person, authorised person, responsible person, loose gears, lifting appliances.
- Explain contents of register for ship's lifting appliances and cargo handling gears (chain register).
- Describe duties of dock safety inspector.
- State the requirements of guarding dangerous parts of the machinery.
- Describe requirements for testing of lifting appliance and loose gears before they used for the first time, requirements for periodic thorough examination and inspection of cargo gears, annealing of loose gears, maintenance of wire ropes, blocks, shackles, hooks, sheaves, pulleys and slings.
- Describe procedures to check weather tightness of hatch covers, securing of hatch pontoons, maintenance and use of side cleats and cross joint wedge mechanism.
- Explain importance of clear drainage channels and drain holes, importance of compression bars and sealing gaskets, need to check hydraulic system for leakage.
- Explain procedures for effective port watch keeping, the items to be checked regarding safety of life, cargo, property, environment and security during a deck watch, the circumstances in which to call Master, the items included in chief officers standing orders/night orders.
- Knowledge of the limitations on strength of the vital constructional parts of a standard bulk carrier and ability to interpret given figures for bending moments and shearing forces.
- Outline and describe the common damage/defects that may occur on water tight transverse bulk heads situated at the ends of dry cargo holds of a bulk carrier.
- State cracks may often be found at or near the connection of the stool of the transverse bulkheads and the tank top in bulk carrier having combination cargo/ballast tanks.
- Action to be taken to avoid the detrimental effects on bulk carriers of corrosion, fatigue, and inadequate cargo handling.
- Explain classification of IMDG cargo, use of IMDG code, MFAG, EmS, segregation table, precautions when handling dangerous goods, dangerous cargo manifest, inspections before loading dangerous goods, dangerous goods carried in containers, construction of magazine for carriage of explosives, limitations of carriage of explosives, compatibility of class 1 cargoes.
- Define angle of repose, flow moist point, transportable moisture limit, flow point, stowage factor, load density.
- Describe preparations for holds for loading.
- Explain purpose and objectives of IMSBC code, classification of cargoes as per IMSBC code, main hazards and precautions with the shipment of bulk solids (ore, urea, concentrates, sulphur, coal, HBI/DRI).
- Explain documentation required prior loading, maximum allowable weight for single and adjacent holds, block loading, purpose and objectives of bulk carrier loading and unloading (BLU) code, test for determining angle of repose and FMP on board, precautions to be taken prior entering cargo holds.
- Define grain, filled and partly filled compartments, trimmed and untrimmed cargo.
- Explain preparations of holds for carriage of grain cargoes, securing free grain surface in partly filled compartment, use of shifting boards, document of authorisation, grain loading stability criteria in detail, contents of grain loading stability booklet, methods to reduce grain heeling moments in order to meet grain stability criteria.
- Explain various hazards in carriage of dangerous goods, safety precautions during cargo operations.

Liquid Cargo

- Define Crude oil, refined products, spiked crude, sour crude, Reid vapour pressure, upper and lower flammable limits, pour point, flammability diagram, TLV, tanker arrangements (tanks, pump rooms, slop tanks, cofferdams, deep tanks), cargo piping system, cargo pumps.
- Explain contents and application of the ISGOTT.
- Define segregated ballast, clean ballast, dirty ballast, slop tank.
- Describe with sketch inert gas system, PV valve, PV breaker.
- Describe hazards involved in COW, cleaning, purging and gas freeing procedures, loading and discharging operations on a tanker.
- List items of pre arrival check list, items of COW check list.
- Explain the use of O₂ analyser, Explosimeter, Tank scope, Draeger tubes.

Chemical Tanker

- Define type 1, type 2 and type 3 chemical tankers.
- Explain various categories (x,y,z, os) of cargoes, hazards associated with chemical cargoes and control measures, various types of tank coating, purpose and use of IBC and BCH code, purpose and objectives of P&A manual, equipment for evaluation of tank atmosphere, threshold limit value of product, odour threshold, informations available in cargo data sheets, with the aid of a simple diagram, a "closed circuit" loading operation using a vapour return line.
- List items of pre arrival checklist, entries made in cargo record book.
- Sketch and describe independent, integral, gravity and pressure cargo tanks, typical tank arrangements with piping.
- Describe hazards involved with tank cleaning, use of slop tanks, cycle of a tank washing system, discharge criteria as per Annex II of Marpol 73/78.

Gas Tanker

- Define type A, type B, type C tanks.
- State each cargo tank is filled with high level alarm and auto shut off.
- Explain purpose and objectives of IGC code, hazards of gas cargoes and control measures adopted, the terms boiling point, cargo area, cargo containment system, gas carrier, gas/dangerous zone, gas safe space, hold space, inter barrier space, MARVS, primary and secondary barrier, tank dome.
- Explain various types of ships (fully pressurized, semi pressurized, fully refrigerated and semi refrigerated), various types of tanks (integral, membrane, semi membrane, independent and internally insulated tank), certificate of fitness, detection of cargo leakage through primary barrier).
- Sketch and explain deepwell pump, re-liquefaction plant.
- List contents of pre cargo checklist, fumigation information which should be supplied to the Master.
- Explain reasons for the control of pest, International health regulations, precautions when the vessel is fumigated, how contact insecticides are used for dealing with local infestation, procedure to make man entry in the space after fumigation.
- State vulnerable areas on ships requiring particular attention, permission to be obtained from port state an administration prior fumigation.
- Calculate quantity of cargo loaded/ to load, discharge/ to discharge by draft survey (ship stability book), Quantity of cargo using ASTM tables, given density at 15 degrees centigrade in vacuum dimensions of the cargo space and ullage at observed temperature.
- Using WRF, weight of cargo in tank, quantity of cargo / water by using wedges formula.

Ship Stability

- State Simpson's Rule 1, 2 and 3.
- Calculate Areas, Volume, TPC, FWA using Simpson's rule, Geometric centre of areas and volumes.
- Explain the formula $FSC = i/Vol$
- Explain $i = lb^3/12$ for rectangular areas
- Calculate free surface correction using formula and ship stability booklet.
- Moment of inertia (i) of a tank using Simpson's rules.
- Explain maximum dead weight moment, minimum permissible GM, maximum permissible KG (diagrams/tables)
- Explain use of diagrams of dead weight moment.
- Explain LCG, LCB, effect of loading, discharging and shift of weight on LCG, effect of change in underwater volume on LCB, trimming moment, Moments required to change trim by 1 cm (MCTC).
- Explain why BM_1 is used instead of GM_1 to determine MCTC, effect of change in density on MCTC.
- Explain $Trim = Trimming\ Moment / MCTC$.
- Explain $Change\ in\ trim = change\ in\ draft\ forward + change\ in\ draft\ aft$.
- Explain use of trim tables.
- State centre of floatation is centroid of water plane area, LCF is the tipping centre or the pivoting point about which the vessels changes her trim.
- $Change\ in\ Draft\ aft, T_a = (T_c X LCF) / LBP$
- $Change\ in\ draft\ fwd, T_f = [T_c X (LBP - LCF)] / LBP$
- Calculate quantity of cargo to be loaded /discharged/ shifted to produce a required trim.
- Calculate final fwd and aft drafts, quantity of cargo to be loaded/ discharged to keep the fwd/ aft draught constant, quantity of cargo to be loaded/ discharged to reach desired fwd and aft draft, final trim, fore and aft draft using ship stability booklet.
- Explain cross curves of stability and KN curves, how to determine GZ from cross/ KN curves, effect on GZ values due to shift of weights (vertical and horizontal curves), range of stability.
- Describe effect of increased length, breadth and freeboard on the curve of statical stability.
- Calculate angle of list resulting from transverse and vertical movement of weight using GZ curve, area under the GZ curve using Simpson's Rules.
- State statical stability requirements as per SOLAS, dynamical stability at stated angle of heel represents potential energy of the ship, potential energy is used in overcoming resistance to rolling and in producing rotational energy.
- Explain intact stability requirement for carriage of the grain, volumetric heeling moments caused due to shift of grain in partly filled/ full compartments, use of maximum permissible VHM curves.
- Draw heeling arm curve on Righting arm curve of given ship's condition and determine angle of heel.
- Compare result from calculations above with the criteria set in reg 4 of Grain Code.
- State part of the weight is taken by the blocks as soon as the ship touches the blocks and reduces buoyancy force by same amount.
- Define critical instant, critical period, declivity of docks.
- Explain upthrust (P) causes a virtual loss of GM.
- Explain $Upthrust\ P = (MCTC \times T_c) / distance\ from\ centre\ of\ floatation$, why GM must remain positive until critical instant.
- Calculate minimum GM to ensure ship remains stable at the point of taking blocks overall, maximum trim to ensure ship remain stable at the point of taking blocks overall.
- Virtual loss of GM and drafts of ships after water level has fallen by stated amount, drafts on taking the blocks overall, Loss in GM for fall in water level after sitting overall.
- Explain how the stability of a ship aground at one point on centre line is reduced the same way as in dry dock, how increase in upthrust with fall in tide, increases the heeling moment and reduces the stability.
- Calculate virtual loss of GM and drifts of ship after tide has fallen by a stated amount, point of grounding, given initial drafts after grounding.

Ship Constructions

- Describe manual arc welding, automatic welding process, electro-slag, electro-gas, TIG, MIG, SAW, Resistance welding, Butt, Lap and fillet welds, preparation of plate edge for welding, Use of tack welding, Weld fault: lack of fusion, penetration, re-enforcement, root penetration, slag inclusion, porosity, overlap and under cut, gas cutting of metals, various tests for welds.
- Explain purpose of flux, single pass, multi pass and back run, full penetration fillet weld, distortion due to welding and measures to minimise them.
- State classification societies require test on weld materials and electrodes before approval.
- State regulation regarding minimum number of bulkheads and their locations.
- Define water tight, non water tight, weather tight, oil tight and corrugated bulk heads.
- Sketch and describe construction of W/T bulkheads and its attachments to sides and tank top.
- How water tightness is maintained when bulkheads are pierced by longitudinal, beams or pipes.
- Explain purpose of wash bulkheads, use of cross ties in tankers, procedures for testing of bulkheads, Racking stress and transverse bulkheads.
- Compare water tightness and weather tightness.
- State W/T doors, mechanism, indicators and all associated valves must be inspected once a week, All W/T doors in main transverse bulkhead must be operated daily, Drills for operating W/T doors, side scuttles, valves and closing mechanisms must be held weekly, Records of drills and inspections to be entered in the log book with record of any defects.
- Explain categories of watertight doors (Class 1, Class 2, Class3), Rules regarding number of openings in passenger ship and W/T doors, difference between water tight and weather tight doors.
- Sketch and describe arrangement of power operated sliding W/T door, hinged W/T door and means of securing them, Ramp doors of Ro-Ro ships, Ship side doors.
- Explain corrosion, erosion, corrosion triangle, formation of corrosion cell, Galvanic series of metals, stress concentrations leading to corrosion cell formation, difference in surface condition leading to formation of corrosion cells, cathodic protection using sacrificial anodes.
- Describe impressed current system, measures to minimise corrosion, treatment of steel in shipyard.
- Explain structure of paint and purpose of each constituent, purpose of material safety data sheets (MSDS).
- List common paint vehicle: drying oil, oleo-resins, alkyd resins, polymerizing chemicals and bitumen and state suitability of each for various applications.
- Describe typical paint schemes for: underwater areas, boot topping, top sides, weather decks, superstructures and tank interiors, surface preparation for painting, safety precautions when using paints, how anti fouling paint acts, how anti-corrosive paint acts.
- Define statutory and mandatory surveys.
- Explain initial survey, intermediate survey, annual survey and renewal survey, harmonised system of ship surveys, enhanced surveys, conditions assessment scheme (CAS), conditions assessment programme (CAP).

Ship safety, Damage control & Maintenance

- Explain purpose and objectives of LSA code, LSA requirement as per SOLAS.
- Explain how to draw a muster list and emergency instruction for a given crew and type of vessel, how to assign duties, division of crew into command, emergency and backup teams, how drills and practices should be organized keeping fatigue factor in consideration, importance of debriefings after a drill, importance of steps to be taken to follow up conclusions of any drill.
- Maintenance of operational condition of life saving fire fighting and other safety system.
- Actions to be taken to protect and safe guard all persons on board in emergencies.
- Explain methods and aids for fire preventions and detections and extinction: fire prevention procedures, different types of fires and fire fighting equipments to be used, fighting fire on different types of ships.
- Understands functions and use of life saving appliance: Different types of emergencies, actions taken, life-saving appliance and instructions to use it.
- Describe how to draw plans for maintenance and inspection of life saving, fire fighting and other safety systems (Remote controlled W/T doors, Bilge alarms).
- Describe Procedure for maintenance of LSA (Lifeboat, launching appliance, life boat equipment including radio life-saving appliance, satellite EPIRBs, SARTs, immersion suit and thermal protective aids; life jackets: pyrotechnics: Line Throwing Apparatus), procedure for maintenance of FFA (portable fire extinguishers; fire hydrants; fire hoses, fire nozzles International Shore Connections; Fireman's outfit, Self-contained breathing apparatus, fire wallet, fire dampers, fire flaps and ventilators, EEBD).
- Describe actions to be taken in event of fire on own ship (accommodation, engine rooms, cargo spaces and gallery).
- Explain how to draw plans to deal with: fire and explosion.
- List contents of emergency check list for fire explosion, collision and grounding.
- Explain Role of safety committee, purpose and objectives of code of safe working practices, Dock safety regulations, Procedures for reporting of accidents, Security levels and duties and responsibilities of every individual at various levels as per ISPS Code, Action to be taken in case of piracy or armed robbery.
- Describe planned maintenance system (PMS), care and maintenance of ropes, wires, accommodation ladders, pilot hoist and pilot ladders, W/T doors, mooring equipments, hatch cover and cargo handling equipment.
- Demonstrate the knowledge of preparations of contingency plans for response to emergencies: Drawing plans to deal with emergencies legal aspects and seamanship practise.
- Understands ship construction with regards to damage control.
- Explain how to draw plan to deal with: Leakage and spills in dangerous cargoes, rescue of victims from enclosed spaces, heavy weather damage, rescue of survivors from another ship or sea, & abandon ship, Constructional features with regards to damage control.

- State that the principles include: being calm and even in temperament when giving orders and dealing with offenders, being honest and fair in all matters, and being firm when necessary, treating all staff on the same basis, avoiding causing disappointment to staff, avoiding making promises, having a proper attitude towards spokesmen or representatives of trade unions, making allowances for differences in nationality, language, religion and other cultural matters affecting behaviour and attitude, ensuring that all staff feel that their services on board are appreciated.
- State the reason why people work: need to earn money, need to be a useful member of society, need for security of their standard of living, need to use their manual and mental skills and to derive satisfaction from them, and need to achieve their ambitions and improve their status.
- State the appointment of a person to a higher rank gives authority, the real authority is achieved when the person concerned demonstrates that he knows the work, is decisive, decisions are generally correct, orders are clear and are quickly carried out without argument, seeks advice when necessary and helps others, accept orders from superiors and carry them out and accepted by those with whom he works.
- State training should be based on attitude, skill and knowledge.
- Explain the purpose of on-board training, why training should be relevant to the trainees work and duties aboard ship, how to conduct a training session (purpose objective, contents, mode of training, briefing and debriefing), importance of group activity, demonstration and hands on experience.
- Explain principles underlying the ISM code, content and application of ISM code, principles underlying STCW convention, content and application of the STCW convention, hours of rest for watch keepers as per STCW and MLC.
- Explain signs of fatigue, causes of fatigue, the results, if fatigue is overlooked and / or allowed to develop, need to maintain work/ rest hour records, importance of meetings on board for planning, importance of safety committee.
- State personnel assignment depends upon knowledge, skill, experience, competence, attitude, ship design, manning arrangements, external environmental conditions, reliability of equipment and machinery, and operational conditions.
- State the work be planned, allocated, delegated, keeping in mind the time and resource constraints, the importance of using all the available resources, with proper planning to obtain optimum results.
- State importance of prioritizing the work, in different day to day scenarios.
- State the importance of allocating, assignment and prioritization of resources.
- Explain interactive and closed loop communication, importance of effective communication, briefings and debriefings.
- Explain factors to be taken into consideration to allocate and delegate the tasks, effective resource management taking into account the experience of the team, error chains and explains how they can be avoided.
- Define authority and assertiveness, motivation.
- Explain need for a balance between authority and assertiveness, methods of motivation and the importance of motivating the crew to obtain the optimum result.
- Explain the importance of obtaining and maintaining situational awareness.
- Explain method to carry out situation and risk assessment.
- Explain need to identify and generate all possible options, method of selecting effective course of action.
- Explain need to evaluate the outcome effectiveness.
- Explain how to develop standard operating procedures (SOP's), methods to implement the SOP's, reasons of over sighting of SOP's and the dangers associated with over sight.

***** ALL THE BEST *****