	DIRECTORATE GENERAL OF SHIPPING, GOVT.OF INDIA, MUMBAI	**IS/ISO Clause No.7.1**
Ref.:QMS - 7.0 Page 1	**Subject:**- Revised syllabus for conduct of GP Rating maritime training course – reg.	**F. No. TR/Cir/8(3/2013**
Approved by the Director General of Shipping & Special Secretary to the Govt. of India.	TC No.No. 01 of 2018	**Date : 22.01.2018**

In supersession of this office training circular No. 8 of 2016 dated 17.11.2016, the syllabus for the GP rating maritime training course was revisited by this office and a revised syllabus is enclosed herewith.

The revised syllabus will be applicable for the batch commencing from January, 2018 onwards.

22 Jan. 2018

(Deependra Singh Bisen)
Asstt.Director General of Shipping

To
1. All DGS approved Maritime Training Institutes.
2. Principal Officer, MMD, Mumbai/Chennai/Kolkata/Kandla/Kochi.
3. NA/CS.
4. Shipping Master, Mumbai/Chennai/Kolkata.
5. INSA/MASSA/FOSMA
6. Maritime Seafarers Unions

Training Circular No. 01 of 2018

THESE GUIDELINES ARE FOR THE

CONDUCT OF

PRE-SEA TRAINING COURSE FOR GENERAL PURPOSE (GP) RATINGS IN COMPLIANCE WITH STCW CONVENTION AS AMENDED IN 2010

ISSUED BY

THE DIRECTORATE GENERAL OF SHIPPING

TABLE OF CONTENT

PRE-SEA TRAINING COURSE FOR GENERAL PURPOSE (GP) RATINGS

1. PREAMBLE

Safety and efficiency of ship operation are dependent on the professional competence and dedication to duty of the seafarers on board. Hence maritime education and training, and within that, pre-sea training is of vital importance. With this in mind, this course is compulsorily residential with workshop training, boat work, team games, swimming, physical training, parade and a host of other extra-curricular activities. Students successfully completing this course should have the required standard of knowledge, communication skills in English, competence and cheerful obedience to orders of superiors, team spirit, leadership and other seaman-like qualities. These guidelines shall be followed in letter and in spirit.

2. BASIC DETAILS OF THE COURSE

2.1 Aims

To provide pre-sea training that would balance theoretical knowledge, practical skills, safety consciousness and efficiency for those who wish to take up seafaring as a profession to serve as ratings on merchant ships.

2.2. Objectives

By conducting compulsorily residential, regimented and disciplined courses to impart training that would, after the prescribed sea experience, enable a rating to comply with Regulation II/4 and III/4 of STCW convention as amended in 2010, achieve the standards of competence as specified in Table A-II/4 (‘Rating forming part of a Navigation watch’) and A-III/4 (‘Rating forming part of an Engine room watch’) of STCW convention as amended in 2010 and hence become eligible to serve on merchant ships as a Watch Keeping Rating. The curriculum intends to make the rating competent all round with hands on skills in both the deck and engine departments and not merely comply with minimum requirements.

The curriculum also includes the knowledge, understanding and proficiency as specified in Table A-II/5 (‘Able Seafarer - Deck’) and A-III/5 (‘Able Seafarer - Engine’) of STCW convention as amended in 2010 and after the prescribed sea experience as watchkeeping rating, would enable the rating to comply with regulation II/5 and III/5 of the STCW convention as amended in 2010 and obtain certificate of proficiency as “Able Seafarer - Deck” or ”Able Seafarer - Engine” as applicable.

2.3. Scope

These guidelines are for institutes that already conduct, or seek approval of the Directorate General of Shipping (DGS) to conduct, Pre-Sea Training Courses for General Purpose (GP) Ratings.

2.4. Application

Compliance with these guidelines, read in conjunction with DGS Order no: 7 of 2016 dated 17.11.2016, and DGS Order no. 5 of 2013 dated 15.03.2013, shall be mandatory for all institutes. Existing Institutes are required to ensure full compliance with these Guidelines by 1st January 2018. These guidelines are course-specific, superseding Training Circular No. 09 of 2010 dated 07.09.2010, Training Circular No. 08 of 2016 dated 17.11.2016 and other guidelines issued earlier specifically for this course.

3. QUALIFICATION & ELIGIBILITY OF CANDIDATES

3.1. Entry standards (to be verified by the Institute)

3.1.1. Academic standards:

1. X^{th} Standard pass from government recognized board with subjects English, Mathematics & Science with 40 % aggregate. English 40% in X^{th} / XII^{th}
   OR
2. XII^{th} Standard (any stream) pass from government recognized board with 40 % aggregate. English 40% at X^{th} or XII^{th} but with subjects English, Mathematics & Science at X^{th}.
   OR
3. Pass in 2 year ITI course (Fitter / Machinist / Mechanic / Welder / Turner) approved by DVET / NCVT; with minimum 40% aggregate marks in final year of ITI & minimum 40% in English in X^{th} / XII^{th}.

3.1.2 Age limit: Minimum age 17½ years and maximum age 25 years on the date of commencement of course.

Institutes shall comply with DGS Order no.4 of 2014, dated 10.04 for relaxation in upper age limit belonging to SC/ST candidates.

3.1.3 Physical standards: As per Merchant Shipping (Medical Examination) Rules, 2000 and
Merchant Shipping (Medical Examination) Amendment Rules, 2016 as amended from time to time.

3.2. Required attendance and conduct

All trainees must join the course within the first ten days of commencement of the course. Considering that the course is residential, attendance shall normally be 100%. However, 90% and above is acceptable. In exceptional cases, the head of the institute may accept attendance of 75% and above if he is satisfied that the reason for shortfall is genuine and that the trainee's performance in the course has been good. Such reasons shall be recorded and be available for inspection.

Should any candidate fail to satisfy the above criteria, the institute must intimate the name to the Directorate General of Shipping (Training Branch) and to the Examination Authority before the commencement of the All India Exit Examination.

3.3. Course intake limitations

The sanctioned number of ratings shall not exceed 40 per class and in multiples with a maximum of 40 per class, thereafter. For fresh approvals, commencement can be made with one batch of maximum 40 trainees on demonstrating the placement demand, and thereafter additional batch(es) approval may be sought on satisfying relevant conditions laid down by DG Shipping. The course intake, expansion of capacity and fresh approvals shall be governed by orders issued by the DGS from time to time.

4. INFRASTRUCTURE REQUIREMENTS

4.1 Infrastructural requirements to be in line with DGS Order no: 7 of 2016 dated 17.11.2016.

4.2 List of Course Specific minimum equipment required for this course is given in **Annexure 9**.

4.3. The following facilities of suitable area commensurate with the number of trainees at a time, with equipment as listed in **Annexure 9:**

- Navigation
- Seamanship
- Marine Engineering
- Carpentry
- Plumbing
- Turning, Machining, Fitting
- Electrical
- Hot Work

5. COURSE DETAILS

5.1. Duration of the course: The duration of the course shall be SIX MONTHS (twenty-Five weeks).

5.2. Dates of commencement of the course: Courses shall commence on the first working day of **January** and **July** every year.

5.3. Course Syllabus:

The syllabus for this twenty-five-week course includes five basic modular courses as follows:

i. Proficiency in Survival Techniques
ii. Elementary First Aid
iii. Fire Prevention and Fire Fighting
iv. Personal Safety and Social Responsibility
v. Security Training for Seafarers with Designated Security Duties

5.4. Course Structure, Specific Learning Objectives, and Practical Tasks:

5.4.1 Course Outline: As per **Annexure 1**.

5.4.2 Outline of each part of the course **Annexure 2**

5.4.3 Tasks and expected contact hours for each component:

Part 1 – Maritime English and General Ship Knowledge (GSK) **Annexure 2 A**
Part 2 - Navigation (NAV) **Annexure 2 B**
Part 3 - Cargo Handling and Stowage (CSH) **Annexure 2 C**
Part 4 - Marine Engineering Knowledge & Practice (MEK) **Annexure 2 D**
Part 5 - Electrical, Electronic & Control Engineering (EEC) **Annexure 2 E**
Part 6 - Controlling the Operation of Ship and Care for Persons on Board (COS) **Annexure 2 F**
Part 7 – Maintenance and Repair (M&R) **Annexure 2 G**
Part 8 - STCW Mandatory Courses **Annexure 2 H**
Part 9 - Upkeep of the Campus **Annexure 2 I**
Part 10 – Holidays and Passing Out Function **Annexure 2 J**

5.4.4 Assessment (Internal and External) detailed in **Annexure 4**

5.4.5 Specific Learning Objectives for Part 1 ME & GSK **Appendix 1A**

5.4.6 Specific Learning Objectives for Part 2 NAV **Appendix 1B**
5.4.7 Specific Learning Objectives for Part 3 CHS **Appendix 1C**
5.4.8 Specific Learning Objectives for Part 4 MAR **Appendix 1D**
5.4.9 Specific Learning Objectives for Part 5 EEC **Appendix 1E**
5.4.10 Specific Learning Objectives for Part 6 COS **Appendix 1F**
5.4.11 Specific Learning Objectives for Part 7 M&R **Appendix 1G**
5.4.12 Specific Learning Objectives for Part 8 STCW **Appendix 1H**
5.4.13 List of Practical Skill Tasks **Appendix 1I**

6. FACULTY REQUIREMENTS

6.1. Qualification and experience of Principal and faculty members:

Institutes shall comply with para 3.8 of DGS Order 5 of 2013.

The Principal, and the Vice Principal if designated, and faculty shall hold minimum qualifications of a Certificate of Competency, issued or recognised by the Government of India, as Chief Mate (FG) of a foreign going ship or Master Near Coastal Voyages (NCV) (for Nautical subjects) and MEO Class II (FG) or Chief Engineer NCV (MEO III) (for Engineering subjects).

6.2. Qualification and experience of faculty members (academic subjects):

Academic faculty, if employed, should possess at least a Bachelor's degree in the subject taught by them.

6.3. Minimum Qualifications and experience of instructors:

6.3.1 Held a rank as Bosun (Serang) or Able Seafarer on a merchant ship.
6.3.2 PT instructor should have PTI qualification.
6.3.3 For Seamanship, Ex-Navy instructors must be Petty Officers from the Seamanship branch.
6.3.4 For Machine Workshop, Fitters who have five years sea experience on merchant ships or ex-Navy / CG instructors with qualification as Mechanician/ Engine room artificers.
Instructors for skills such as Carpentry, Plumbing, possess appropriate trade certificates from ITI or persons who have five years sea experience on merchant ships as Petty officer (maintenance) or equivalent acceptable to DGS.
6.3.5 Instructors for Electrical Workshop may be persons who have experience on merchant ships of one year as Electrical Rating or five years as Electrician/wireman or ex-Navy / CG Petty officers from the electrical branch.

6.4. Training of Trainers Course:

All faculty members and instructors must have undergone an appropriate approved training course – Training for Trainers & Assessors (TOTA) Course for faculty members and Training for Trainers and Instructors (TOTI) for instructors. TOTA exemptions shall be applicable as per DGS Order 5 of 2013.

6.5. Faculty Strength:

6.5.1. The number of trainees in a lecture class shall not exceed 40.
6.5.2. For practicals and other work where greater inter-action is necessary, the class should

be sub-divided into groups of not more than 8 trainees per instructor.

6.5.3. A minimum of 50% of all lectures and practicals put together shall be delivered by the Full time faculty and instructors of the institute.

6.6. The minimum faculty and instructor strength:

6.6.1 For up to 40 Ratings per course: Inclusive of the course in charge, not less than one (1) holding COC as Chief Mate of Foreign Going ship or Master-Near Coastal Voyages (NCV) and one (1) holding COC as MEO II or Chief Engineer NCV (MEO III) and five (5) instructors qualified to cover Seamanship, Carpentry, Plumbing, Machining, Electrical Work, hot work, Marine Engineering Work, Drill and Physical Training.

6.6.2 For 41 to 80 Ratings per course: Inclusive of the course in charge, not less than two (2) holding COC as Chief Mate of Foreign Going ship or Master-Near Coastal Voyages (NCV) and one (1) holding COC as MEO II or Chief Engineer NCV (MEO III) and eight (8) instructors qualified to cover Seamanship, Carpentry, Plumbing, Machining, Electrical Work, hot work, Marine Engineering Work, Drill and Physical Training.

6.6.3 For 81 to 120 Ratings per course: Inclusive of the course in charge, not less than three (3) holding COC as Chief Mate of Foreign Going ship or Master-Near Coastal Voyages (NCV) and two (2) holding COC as MEO II or Chief Engineer NCV (MEO III) and ten (10) instructors qualified to cover Seamanship, Carpentry, Plumbing, Machining, Electrical Work, Hot work, Marine Engineering Work, Drill and Physical Training.

6.6.4 For 121 to 160 Ratings per course: Inclusive of the course in charge, not less than four (4) holding COC as Chief Mate of Foreign Going ship or Master-Near Coastal Voyages (NCV) and two (2) holding COC as MEO II or Chief Engineer NCV (MEO III) and twelve (12) instructors qualified to cover Seamanship, Carpentry, Plumbing, Machining, Electrical Work, Hot work, Marine Engineering Work, Drill and Physical Training.

6.7. Faculty and Instructor Teaching Hours :

Institutes shall comply with para 5 of DGS Order 5 of 2013.

7. DUTY OFFICER AND DUTY INSTRUCTOR

There must be at least one Nautical Officer or Engineer Officer or Warden (senior instructor) and one instructor on duty on the campus at all times during the course period.

8. CONTACT HOURS PER WEEK

The curriculum shall be planned for a 42 hour six-day week.

Routine for the day: (Mon-Sat) – for guidance only

0600	Fall-in
0600-0830	Wash/PT-Yoga/ Clean Ship/ Parade/ Breakfast
0830-1245	Classes/Workshop/Lab **(with 15 min break)**
1245-1330	Lunch Break
1330-1630	Classes/Workshop/Lab **(with 15 min break)**

1630-1700	Break
1700-1830	Sports/ Swimming/ Parade/ Library/ Project work
1830-1930	Wash
1930-2000	Dinner
2000-2100	Indoor Games/Recreation/ Library
2100-2200	Self-Study
2200	Lights out

9. HOLIDAYS

9.1 Sundays shall be holidays. However English communication sessions may be conducted for weak students as required.

9.2 Independence Day and Republic Day shall be compulsory holidays.

9.3 All government holidays, applicable to the state in which the institute is situated, shall normally be observed.

10. UNIFORMS

10.2. **For ratings**: The list of uniforms, accessories and text books that each Rating must possess while under training in the institute is given in **Annexure 3**

10.3. **For faculty**: While in the campus of the institute, all teaching staff and faculty must wear uniforms as set out in **Annexure 8**.

10.4. **For other staff**: The institute may prescribe suitable uniform to be worn by non-teaching staff.

11. QUALITY STANDARDS AND COMPREHENSIVE INSPECTION PROGRAMME

The Institutes shall comply with the requirements of the Quality Standards System as per DGS Order no: 07 of 2016 dated 17.11.2016.

The new Institutes approved from 2017 onwards shall undergo inspection as per the Comprehensive Inspection Programme (CIP) for Pre-Sea Institutes as per DGS Order No. 04 of 2016 dated 12.09.2016 within 15 months of starting the first course and it should achieve a grading of A2 at least, by approved R.O. If any institute is graded less than A2, it will be allowed 1 year time to upgrade to A2, failing which it shall be closed down and derecognized.

The existing Institutes shall undergo inspection as per the Comprehensive Inspection Programme (CIP) for Pre-Sea Institutes as per DGS Order No. 04 of 2016 dated 12.09.2016 within the stipulated time period given therein. If the existing Institute is graded less than B1, it will be allowed to 1 year time to upgrade to B1, and thereafter, if will be allowed 1 year time to upgrade to A2. Until such time the Institutes achieve A2 Grade, no increase in capacity, frequency or batches will be considered for the Institute. The continuation of approval of the Institute getting C1 and C2 rankings may be reviewed by the Director General of Shipping for it to be closed down and derecognized.

12. ASSESSMENT

The structure is given in **Annexure 4**. (Including Rules of Examinations)

Internal Assessment:

A formal midterm test is to be conducted by the institute (written, orals, and practicals) and records of these tests to be maintained.

External Assessment:
In line with DGS guidelines an exit examination shall be conducted by the examination Authority (ref: Training Circular 10 of 2005) or any other body so appointed by the DGS.

13. INSPECTION & DISCIPLINARY ACTION IF ANY FOR DEFICIENCIES

Inspection as per DGS Order No. 07 of 2016 and DGS Order 04 of 2016.
Disciplinary action as per DGS order no: 07 of 2016.

14. COST OF INSPECTIONS

All costs of scheduled inspections shall be borne by the concerned institute.

15. FEES TO GOVT

As per DGS order no: 07 of 2016 & Training Circular No. 09 of 2013.

16. PLACEMENT OF TRAINEES FOR SHIPBOARD TRAINING

16.1 Any new institute, or an institute seeking approval for enhancement of capacity, shall admit only those candidates for whom they have secured sponsorship from shipping companies for six months onboard training. Institutes shall submit the sponsorship letter to DGS, before admitting the students for each batch.

16.2 Undertaking will be obtained from the MTI about placement to be done through Indian shipping companies or DGS approved RPSL agencies. The MMD shall verify the capability of the said Indian shipping companies or RPSL companies to place the students for onboard ship training and shall give a clear finding in this respect in their recommendation to this Directorate after the inspection.

16.3 Institutes are to ensure placement for onboard training with Indian Shipping Companies or DGS approved RPSL, of a minimum of 85% of all its trainees who have passed out from the GP Ratings course within a period of 12 months from the date of passing out / examination result.

16.4 Existing institutes are permitted to induct trainees in the next batch, based on evidence showing that a minimum of 75% of all its trainees who have passed out from the GP Ratings course within a period of 12 months from the date of passing out / examination result, have been placed on board. Existing institutes shall not need to produce sponsorship letters prior inducting the next batch as long as they can demonstrate the 75% minimum criteria of placement of its previous batches.

16.5 The placement records will be checked during every CIP inspection by the ROs, as per the norms specified therein, and any non-compliance will result in the intake of the institute to be reduced for the next academic year or approval will be withdrawn.

17. COMMUNICATION TO DGS & INDOS

A. The institute shall upload all data related to the course on E-Samundra within 15 working days of the commencement of the course And must forward a soft copy and hard copy of list of candidates enrolled for the course to: The Directorate General of Shipping, INDOS Cell and the Examination Authority in the format given below:

Information of Institute	
Name of the Institute	
INDOS No. of Institute	
Approved Capacity	
Course Title	
Batch No.	
Date of Commencement and ending of the course	

			Place X under each as applicable		
S. No.	Registered Name of the Candidate	DOB DD MMM YYYY e.g. (26 MAR 1994)	X Std	XII Std	ITI

B. Together with list of the candidates, institute must submit a complete list of faculty/instructors – Full Time and Part Time in tabulated format as given below.

Course In-Charge and Faculty specifically for the GP ratings course

Starting with Course In-Charge:

S. No.	Qualification	Full Name	Age	Starting with FT – Full Time PT – Part Time
1.				
2.				
3.				
4.				

Instructors specifically for the GP rating course
Starting with – FT – Full Time – PT – Part Time;

S. No.	Qualification	Full Name	Specialization	FT or PT
1.				
2.				
3.				

4.				

C. Within one month from the date of commencement of the course, every institute must apply for INDOS No. for each of the trainee.

D. By the end of the third month from the date of commencement of the course, every institute may apply for CDC for each of the trainee.

E. By end of 10 weeks from the date of commencement of the course, each institute must send details of each candidate together with the INDOS No to the Examination Authority or any other authority specified by DGS.

Annexure 1

COURSE OUTLINE

Total Duration of the Course – 26 weeks (on the basis of 42 contact hours per week)

	Theory Hrs	Practical's / Skill Hours		Total contact	Weeks
Part 1 Maritime English & General Ship Knowledge	**55**	**30**		**85**	**2.02**
Part 2 Navigation at Support Level (A-II/4 & A-II/5)	**28**	**60**		**88**	**2.10**
Part 3 Cargo Handling and Stowage at Support Level (A-II/5)	**16**	**40**		**56**	**1.33**
Part 4 Marine Engineering at Support Level (A-III/4 & A-III/5)	**56**	**120**		**176**	**4.19**
Part 5 Electrical, electronic and control engineering at Support level (A-III/5)	**5**	**30**		**35**	**0.83**
Part 6 Controlling the Operation of Ship and Care for persons on board at Support Level (A-II/5 & A-III/5)	**30**	**118**		**148**	**3.52**
Part 7 Maintenance and Repair at Support Level (A-II/5 & A-III/5)	**20**	**180**		**200**	**4.76**
Total (Part 1 to Part 7)	**210**	**578**		**788**	**18.76**
Part 8 Mandatory STCW Courses and Ship Visit					
A. Proficiency in Survival Techniques (TC 31 of 2004)	**10**	**5**		**15**	**0.7**
B. Elementary First Aid (TC 30 of 2004)	**10**	**5**		**15**	
C. Fire Prevention and Fire Fighting	**13**	**5**		**18**	**0.9**
D. Personal Safety and Social Responsibility (STCW 2010 TC13 of 2012)	**21**	**0**		**21**	
E. Security Training for Seafarers with Designated Security Duties (STCW 2010 TC 27 Of 2012)	**13**	**1**		**14**	**0.56**
F. Port/Dock/Harbour/Ship Visit	**01**	**7**		**08**	
Total of Part 8	**68**	**23**		**91**	**2.16**
Total of Part 1 to Part 8	**278**	**601**		**879**	**20.93**
Part 9 Upkeep of the campus (Three hours per week for 15 weeks) (Outside class hours, supervised by Instructors)		**45**			
Part 10 Holidays/passing out/etc.				**42**	**1.0**
Part 11 English Communication (10 Sundays x 4 hrs ea)		**40**			
Revision	**12**		**19**	**31**	**0.78**
Assessment (Internal)	**14**		**28**	**42**	**2.3**
Assessment Final (External)	**14**		**42**	**56**	
GRAND TOTAL				**1050**	**25**

Annexure 2 - Outline of Each Part of the Course

Annexure 2A

Part 1: Maritime English & General Ship Knowledge
(Please see Appendix 1A Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	Wks
Part 1 – Maritime English & General Ship Knowledge.	**55**	**30**	**85**	**2.02**

S. No.	Topics & sub topics	Theory	Practical
1.1	**Induction to the course, personality and communication skills development, general knowledge about shipping and ships, and introduction to computers**	**2**	
1.2	**General Aspects of Shipping** 1.2.1 Importance of Shipping in the National and International Trade 1.2.2 International Routes 1.2.3 Types of Ships and Cargoes 1.2.4 Shipboard Organization	**10**	**0**
1.3	**Computers (Familiarization)**	**7**	**12**
1.4	**Discipline, etiquettes and Gender Sensitization**	**5**	**1**
1.5	**Health and Hygiene**	**3**	**1**
1.6	**Maritime English - English communication by use of Standard Marine Communication Phrases (SMCP). Reading of Safety Instructions, charts etc.** (It is understood that the trainee has an elementary knowledge of English and is able to communicate using simple English sentences and basic vocabulary. In case the trainee is observed to be weak in English language, he/she shall undergo a General English training prior continuing with this course)	**15**	**12**
1.7	**Nautical Terms – Parts of the Ship (Using ship models and video)** 1.7.1 Hull 1.7.2 Ships Decks 1.7.3 Fore Castle 1.7.4 Poop Deck 1.7.5 Accommodation: (Teaching Aid: Video) 1.7.6 Bridge:(Teaching Aid: Video) 1.7.7 Monkey Island 1.7.8 Cargo Spaces (Cargo Holds, Tanks) 1.7.9 Cargo Handling Gear (Derricks, Cranes, Grabs, Pumps) 1.7.10 Machinery Space (Engine Room/Pump room)	**13**	**4**
	TOTAL	**55**	**30**

Annexure 2 B

Part 2: Navigation at Support Level (A-II/4 & A-II/5)

(Please see Appendix 1B Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	Wks
Part 2 Navigation at Support Level (A-II/4 & A-II/5)	**28**	**60**	**88**	**2.10**

S. No.	Topics & sub topics (indicative hours Theory + Practical)	Theory	Practical
2.1	**Basic Navigation, Contribute to Safe Navigation watch** 2.1.1 Navigation Terms 2.1.2 Sea and Port Watch Systems 2.1.3 Rules of the Road (elementary) & Buoyage 2.1.4 International Code of Signal & Flags 2.1.5 Look Out Duties 2.1.6 Reporting to OOW on sighting 2.1.7 Reporting to OOW on hearing 2.1.8 Relieving the Look-Out Man 2.1.9 Other Bridge Duties	**12**	**20**
2.2	**Information required to maintain a safe watch; Operate emergency equipment & apply emergency procedures** 2.2.1 Navigational aids on the Bridge of a Modern Cargo ship 2.2.2 Operate emergency equipment on bridge & apply emergency procedures 2.2.3 Position of a vessel on a chart 2.2.4 Weather data and tides and their effects	**8**	**6**
2.3	**Steer the Ship & Comply with Helm Orders in the English language** 2.3.1 Magnetic and gyro compass 2.3.2 Helm Orders 2.3.3 Change over from automatic to hand steering and vice versa, NFU	**4**	**20**
2.4	**Berthing, Anchoring and Other Mooring operations** 2.4.1 Mooring system and related procedures 2.4.2 Mooring to a buoy or berth 2.4.3 Anchoring Terms and procedure	**4**	**14**
	TOTAL	**28**	**60**

Annexure 2 C

Part 3: Cargo Handling and Stowage at Support Level (A-II/5)

(Please see Appendix 1C for Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	Week
Part 3 Cargo Handling and Stowage at Support Level (A-II/5)	**16**	**40**	**56**	**1.33**

		Theory	Practical
3.1	**3.1 Cargo Handling** 3.1.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) 3.1.2 Cargo Spaces, Opening & Closing of Hatches 3.1.3 Securing Cargoes 3.1.4 Container Cargo 3.1.5 Bulk Cargo (Other Than Grain) 3.1.6 Bulk Grain Cargo 3.1.7 Preparation of Holds and Segregation of Cargoes 3.1.8 Ventilation and Control	**10**	**20**
3.2	**3.2 Handling of Stores** 3.2.1 Handling gear for lifting stores 3.2.2 Communication signals during handling of stores 3.2.3 Segregation of stores and spares 3.2.4 Lashing and securing of stores	**4**	**18**
3.3	**3.3 IMDG Cargo** 3.3.1 Identification of dangerous goods and placarding 3.3.2 Precautions for their carriage	**2**	**2**
	TOTAL	**16**	**40**

Annexure 2 D

Part 4 : Marine Engineering Knowledge and Practice

(Please see Appendix 1D for Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	Wks
Part 4 Marine Engineering at Support Level (A-III/4 & A-III/5)	**56**	**120**	**176**	**4.19**

Marine Engineering Knowledge & Practice (at support Level)		Suggested (Hrs)	
S. No.	**Topic & Sub topics**	**Theory**	**Practical**
4.1.	**Familiarization with duties and Engine Room environment** 4.1.1. Duties of a Trainee Rating in the Engine Room 4.1.2. Engine Room Space 4.1.3. Engine Room Machinery 4.1.4. Auxiliary Machinery 4.1.5. Symbols used in the engine room 4.1.6. Engine Room watch keeping procedures	**6**	**6**
4.2.	**Basic Turning and fitting** **4.2.1** Hand Tools, Measuring instruments 4.2.2 Use of bench vise and filing, marking and tapping tools. 4.2.3 Use of power tools for grinding and drilling	**4**	**30**
4.3.	**Safe working procedures, Tools & instruments** 4.3.1. Lifting devices and equipment, 4.3.2. Safety precautions while working in the engine room 4.3.3. Safety precautions during bad weather 4.3.4. Safety precautions during hot work 4.3.5. Safety precautions while working on electrical equipments 4.3.6. Safety precautions before entering enclosed spaces 4.3.7. Safety precautions during dry dock 4.3.8. Cleaning of engine using chemical agents, for engine room bilges, disposal of engine room waste 4.3.9. Bilge pumping system 4.3.10. Ballasting & de-ballasting system, bunkering procedures 4.3.11. Maintenance work & preservation	**12**	**20**
4.4.	**Auxiliary Equipment & maintenance work** 4.4.1. Valves & piping system 4.4.2. Pumps and Pumping Systems including ballasting & Deballasting 4.4.3. Joints and gland packing 4.4.4. Filters 4.4.5. Centrifugal separators 4.4.6. Other Auxiliaries 4.4.7. Boiler and Steam System & watch keeping duties 4.4.8. Propeller & shafting 4.4.9. Preservation of equipment in good condition	**6**	**20**

4.5.	**Identify components of diesel engines listed below:** 4.5.1 Generator Engines 4.5.2 Main Engine	**5**	**4**
4.6.	**Compressed air for auxiliary purposes**	**2**	**2**
4.7.	**Machines: Grinder, Drill, Lathe**	**2**	**4**
4.8.	**Basic welding and cutting: Arc welding, gas welding, gas cutting**	**2**	**4**
4.9.	**Lubricants and lubrication**	**1**	**2**
4.10.	**Level measuring devices and techniques**	**1**	**5**
4.11.	**Lagging and insulation**	**1**	
4.12.	**Chemicals on board**	**1**	**2**
4.13.	**Steering Gear** 4.13.1. Function of steering gear, check to be made while taking a round in the steering gear compartment 4.13.2. Bow thruster location & importance	**4**	
4.14.	**Storage tanks** 4.14.1. Types of storage tanks in the engine room 4.14.2. Purpose & operation of quick closing valves	**2**	**2**
4.15.	**Emergencies in the engine room** 4.15.1. Various emergencies in the engine room 4.15.2. Types of audio-visual alarms 4.15.3. Action to be taken on hearing/seeing alarms 4.15.4. Emergency escape routes	**2**	**6**
4.16.	**Fire extinguishing equipment in the engine room** 4.16.1. Portable firefighting appliances in the engine room 4.16.2. Fixed firefighting equipment i.e CO_2, Foam, Water Sprinkler, Hyper Mist, Emergency Fire Pump	**2**	**3**
4.17.	**Basic Marine Engineering at Support Level** 4.17.1. Engineering Materials & Special Tools used for maintenance of Engine Room main & auxiliary machineries 4.17.2. Watch keeping duties on main & auxiliary machineries including boilers 4.17.3. Working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant 4.17.4. Remote operations & internal communications system	**3**	**10**
	Total	**56**	**120**

Annexure 2 E

Part 5 : Electrical, Electronic and Control engineering at Support level (A-III/5)

(Please see Appendix 1C for Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	week
Part 5 Electrical, electronic and control engineering at Support level (A-III/5)	**5**	**30**	**35**	**0.83**

		Theory	Practical
5.1	5.1.1 Safe use of electrical equipment 5.1.2 Hand tools for Electrical Maintenance 5.1.3 Electrical Components & Equipment 5.1.4 Electrical Safety	**5**	**30**

Annexure 2 F

Part 6: Controlling the Operation of Ship and Care for persons on board at Support Level (A-II/5 & A-III/5)

(Please see Appendix 1F for Specific Learning Objectives)

Parts/Title	T Hrs	Practical/ Skill hours	Total Hrs	Wks
Part 6 Controlling the Operation of Ship and care for persons on board at Support Level (A-II/5 & A-III/5)	**30**	**118**	**148**	**3.52**

		Theory	Practical
6.1	**Knowledge of the following procedures and ability to** 6.1.1 Natural and synthetic Fiber ropes, wire ropes, cables and chains, including their construction, use, markings, maintenance and proper stowage 6.1.2 Use marlin spike seamanship skills, including the proper use of knots, splices and stoppers 6.1.3 Rig and unrig pilot ladders, hoists, rat-guards and gangways 6.1.4 Rig and unrig Bosun's chairs and staging 6.1.5 Take precautions and climb a mast 6.1.6 Use Blocks and Tackles	**6**	**60**
6.2	**Contribute to the safe operation of deck equipment and machinery** Knowledge of Deck equipment including 6.2.1 Function and uses of valves and pumps, hoists, cranes, booms, and related equipment 6.2.2 Function and uses winches, windlasses, capstans and related equipment 6.2.3 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists 6.2.4 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea, and in emergencies 6.2.5 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or elevators.	**6**	**12**
6.3	**Safe working practices and personal shipboard safety, incl Personal Protective Equipment- COSWP** 6.3.1. Safe working practices (General) 6.3.2. Risk Assessment (Basic) 6.3.3. Permit to Work System /Work-Permits/ Emergencies 6.3.4. Safe Access to the Ship 6.3.5. Safe Working Practices during Berthing / Un berthing, and Anchoring 6.3.6. Safety Precautions, when working aloft 6.3.7. Safety Precautions, when working over side 6.3.8. Safety Precautions during working in enclosed spaces	**12**	**30**

		Theory	Practical
	6.3.9. Safety Precautions, during manual lifting of weights 6.3.10. Demonstrates working knowledge of electrical safety 6.3.11. Safety precautions when climbing fixed vertical ladders and Portable ladders. 6.3.12. Safety precautions when rigging scaffolding and using it 6.3.13. Safety precautions when handling chemicals and strong detergents 6.3.14. Communicate with other persons on board on elementary safety matters, understand safety Information symbols, signs and alarm signals 6.3.15. Shipping Organization (National) & documents for seafarers 6.3.16. International Organizations and Conventions 6.3.17. Duties of a Gangway Watch in Port (intro to ISPS Code)		
6.4	**Knowledge of flags and flag work** 6.4.1. Demonstrate knowledge and understanding of hoisting and dipping flags and the main single, National flag, courtesy flag, company flag, independent pendants 6.4.2. Flag signals. A, 6.4.3. Flag signals .B, 6.4.4. Flag signals. G, 6.4.5. Flag signals. H, 6.4.6. Flag signals. O, 6.4.7. Flag signals. P, 6.4.8. Flag signals. Q	**3**	**4**
6.5	**Apply precautions and contribute to the prevention of pollution of the marine environment** 6.5.1 Sources of pollution at Sea from ship 6.5.2 Damage to the environment 6.5.3 Importance of prevention of pollution of the sea and means of preventing pollution; Basic knowledge of MARPOL 73/78 6.5.4 Proactive measures to protect the marine environment 6.5.5 Knowledge of the Use and operation of anti-pollution equipment. 6.5.6 Disposal of Garbage 6.5.7 Exchange of ballast water	**3**	**12**
	Total	**30**	**118**

Annexure 2 G

Part 7: Maintenance and Repair at Support Level (A-II/5 & A-III/5)

(Please see Appendix 1G for Specific Learning Objectives)

Parts/Title	Theory Hrs	Practical/ Skill hours	Total Hrs	Wks
Part 7 Maintenance and Repair at Support Level (A-II/5 & A-III/5)	**20**	**180**	**200**	**4.76**

		Theory	Practical
7.1	**Surface Preparation and Painting** 7.1.1. Identification of condition of corrosion on the surface 7.1.2 Hand and power tools used for surface preparation 7.1.3 Maintenance of Power tools 7.1.4 Safe working practice during surface preparation 7.1.5 Procedure for cleaning surface prior paint application 7.1.6 Paint types 7.1.7 Tools for paint application 7.1.8 Sequence of paint coatings 7.1.9 Disposal of paint residues, solvents, sweepings.	**10**	**50**
7.2	**Lubrication** 7.2.1 Lubrication plan for the ship 7.2.2 Types of lubricants 7.2.3 Equipment used for lubrication 7.2.4 Safe working practice when using lubrication equipment	**3**	**20**
7.3	**Chemicals for Cleaning** 7.3.1 Hazards of use of chemicals 7.3.2 Stowage of chemicals 7.3.3 Safety Data Sheets for chemicals 7.3.4 Safe working practice when using chemicals	**2**	**10**
7.4	**Repairs** 7.4.1 Precautions to be used when carrying out hotwork 7.4.2 Use of cutting and welding equipment to the level of 2G welder 7.4.3 Use of drill bits, cutting blades and abrasive wheels 7.4.4 Join and Secure components 7.4.5 Lathe work – fabrication of components using machine tools 7.4.6 Plumbing repairs 7.4.7 Carpentry to prepare cement box and other wood repairs	**5**	**100**
	Total	**20**	**180**

Annexure 2 H

Part 8 : STCW Mandatory Courses and Ship Visit

Parts/Title	Theory Hrs	Practical Skill hours	Total Hrs	Wks
Part 8 STCW Mandatory Courses and Ship Visit (A-VI/1 and A-VI/6)	**68**	**23**	**91**	**2.16**

Title	Theory Hrs	Pract Hrs	Total Hrs	Wks
STCW Mandatory Courses and Ship Visit				
• Proficiency in Survival Techniques	**10**	**5**	**15**	**0.7**
• Elementary First Aid	**10**	**5**	**15**	
• Fire Prevention and Fire Fighting	**13**	**5**	**18**	**0.9**
• Personal Safety and Social Responsibility	**21**	**0**	**21**	
• Security Training for Seafarers with Designated Security Duties	**13**	**1**	**14**	**0.56**
• Port/Dock/Harbour/Ship Visit	**1**	**7**	**8**	
Total	**68**	**23**	**91**	**2.16**

Annexure 2 I
Part 9 : Upkeep of the Campus

Parts/Title	Theory Hrs	Pract Hrs	Total Hrs	Wks
Part 9 Upkeep of the campus (Three hours per week for 15 weeks) (Outside class hours, supervised by Instructors)	**-**	**45**	**-**	**-**

The Upkeep would include, cleaning of the cabins, hostels, re-rusting, painting, repair work, plumbing, maintenance of the garden, campus, gym equipment, etc.

Annexure 2 J
Part 10 : Holidays / Passing Out Function

Title	Theory Hrs	Pract Hrs	Total Hrs	Wks
Part 10 Holidays/passing out/etc.			**42**	**1.0**

Annexure 3

List of approved accessories and recommended books and accessories for Pre Sea Courses for GP Ratings

S. No	Accessories	Quantity
1.	Boiler Suits	4
2.	White Uniform Shirt, Half Sleeves/Full Sleeves	2
3.	White Uniform Shorts/Black Trousers	2 pairs
4.	Black Leather Belt with Buckle	1
5.	Blue Stockings	2 pairs
6.	Soft, Blue Peak Cap with emblem of institute	1
7.	White "T" shirts with the emblem of institute	2
8.	Sports Shirt – coloured	2
9.	Sports shorts – (coloured)	2
10.	Black socks	2
11.	Pugree (Blue Cotton) for Sikhs only	1
12.	Coloured swimming trunks	1
13.	Black Shoes (without toe caps with laces)	1 pair
14.	Black Safety Shoes (ISI standard)	1 pair
15.	Leather Safety Gloves	1 pair
16.	Safety Goggles	1
17.	Ear Defenders	1
18.	Helmet	1
19.	Geometrical Instrument Box with Pencils, Erasers and Coloured Pencils	1
20.	Exercise Books as specified by the institute	-
21.	Black Shoe Polish	1
22.	Track suit	1 pair
23.	White Handkerchief	4
24.	Winter sweater (blue)	1

Text Books (to be issued to each candidate)

01. Basic Seamanship Marine Engineering and Human Relations for Seafarers Vol. 1 & Vol. 2 by Board of Examinations for Seafarers Trust.

Reference Books

01. Seamanship Primer by Capt. J. Dinger
02. Safe Working Practices (MCA - UK) publication
03. Seamanship Techniques 1 Shipboard Practice, D.J. House
04. Admiralty Manual of Seamanship (HMSO)
05. Bridge Watchkeeping, a practical guide, Nautical Institute
06. Mooring and Anchoring Ships, Volume 1 and 2, Nautical Institute
07. Ship Knowledge, Dokmar Publications
08. The COLREGS Guide, Dokmar Publications
09. 21st Century Seamanship, Witherby Seamanship
10. A Guide to the Collision Avoidance Rules, by Cockcroft and Lameijer
11. The Boatswain's Manual, Brown, Son and Ferguson, Ltd.
12. Marine Navigation and Safety of Sea Transportation, Nautical Institute
13. Shipboard Drills, Witherby Seamanship
14. Ashley Book of Knots, Doubleday

15. Illustrated Dictionary of Cargo Handling, Taylor & Francis Ltd.
16. The Theory and Practice of Seamanship, Routledge
17. Peril at Sea and Salvage, International Chamber of Shipping, OCIMF
18. Accident Prevention on Board Ship at Sea and in Port, International Labour Office
19 Onboard Safety, Witherby Seamanship
20. Basic Marine Engineering – Author – Jai Kishen Dhar – Publisher – G. Maritime Publications
21. The Best Seamanship – A Guide to Engine Skills – Publisher – International Mariners Management Association of Japan (IMMAJ).
22. Seafarers' Health Information Programme – a set of booklets - International Seafarers Welfare and Assistance Network (ISWAN).
23. Unitor Welding Handbook – Wilhelmsen Ships Service.
24. A Guide to Safety and Health at Work for Gas Welding and Flame Cutting - Occupational Safety and Health Branch Labour Department
25. A Textbook of Workshop Practice by R.S. Khurmi, and J.K. Gupta
26. IMO Model Course 3.17 – Maritime English

Annexure 4

STRUCTURE OF ASSESSMENT

Parts/Title	Theory Hrs	Pract Hrs Skill hours	Total Hrs	Wks
Assessment (Internal and External)	**28**	**70**	**98**	**2.33**

Title	Theory Hrs	Pract / Skill Hrs	Total Hrs	Wks
Assessment (Internal)	**14**	**28**	**42**	**1**
Assessment (External)	**14**	**42**	**56**	**1.33**

Internal Assessment:
Each institute is expected to have an internal assessment scheme to monitor the progress of each trainee and effectiveness of teaching inputs. Ideally, formal assessment at the end of each month should suffice; however, institutes can introduce 'continuous assessment' system that monitors the progress of each candidate at appropriate intervals. Institutes need to create and document their scheme and maintain records of assessment. Internal assessment should also include elements such as discipline, attendance, attitudes, extra-curricular activities, seamanship, teamwork and similar traits. Institutes should specify disciplinary norms, and disqualify any trainee who fails to reach minimum standards. Such a trainee should be barred from taking All India Exit Examination. Such an action must be communicated to the authorised examination body, and DGS, immediately.

Practical Training Record Book
Each trainee will be issued a DG approved 'Practical Training Record Book' developed and periodically revised by the authorised examination body. When a trainee can perform the listed tasks to a satisfactory level, Record Book to be signed by instructor in-charge, and counter signed by the Course in-charge. The Trainee shall present the completed Practical Training Record Book to the Examiner during Practical and Oral Examination and retain the same. Institutes must send the Ship Visit Reports to the authorized Examination body before the commencement of the exit examination.

External Assessment:
All India Exit Examination to be conducted by the Examination Authority as per the guidelines issued and revised from time to time. The assessment scheme shall be as follows:

S.No	Subject	Mark	Pass Mark	Mode	Duration
1.	Maritime English, General Ship knowledge, Navigation and Cargo work, and Controlling and Operation of Ships (Part 1+2+3+6)	75	45	Online	45 minutes
2.	Marine Engineering, electrical	75	45	Online	45 minutes

	Knowledge, Knowledge of Machinery Equipment and watch Keeping procedure, safety and prevention of marine environment, and Repair and Maintenance (Part 4+5+7)				
3.	Navigation, Watch keeping, helm order, bridge Procedures, seamanship, care and maintenance of ships and completion of Practical Record Book Safety of personal and survival techniques, first aid, and fire-fighting techniques	175	105	Practical and Oral	60 minutes
4.	Skill Test- Marine engineering work shop practice, Electrical workshop practice, fitting, plumbing, carpentry, basic cutting/welding & use of machines and completion of Practical Record Book. Marine engineering, Knowledge of Machinery Equipment and watch Keeping procedure, safety and prevention of marine environment.	175	105	Practical and Oral	60 minutes

The trainee must pass in each of the 4 sections to be declared successful.

The external examination will be conducted during the months of June and December for fresh, repeater and deferred candidates. Additional examination, for only repeater and deferred candidates, will be conducted in the month of March and September.

Annexure 5

RULE FOR ISSUE OF PASSING OUT CERTIFICATE BY THE INSTITUTE (Format in Annexure 7)

The training institute shall award a Passing out Certificate (in the format shown in Annexure 7) to only those candidates who have passed the All India Exit Examination conducted by the examination authority.

Annexure 6

Rules for the conduct of All India Exit Examination
Rules for Ratings Exit Examination

1. **Definitions:**

   A. **Fresh Candidate (FC)** – A person appearing for the first time at the end of the training period.

   B. **Repeater Candidate (RC)** – A person who has failed or absent in any one of the previous examination

   C. **Deferred Candidates (DC) – A person who did not appear at the end of the training period due to illness or other exigency but appearing at subsequent examination.**

2. **Eligibility criteria:**

Candidate attending a training programme at a DGS approved training institute.

Applying through the training institute, and satisfying other criteria of admissions, discipline, attendance, and internal assessment at the institute.

Possession of an INDoS No. The institute must furnish INDoS No. to the Examination Authority within ten weeks from the commencement of the Course.

Attendance Record provided by the institute is in compliance with Para 3.2 of the Guidelines.

3. **List of Candidates to be forwarded by the institute:**

The institute will be required to forward complete details of the candidates who are to appear for examination alongwith application forms one month prior to the examination. This will be treated as final record of enrolled candidates at any time in the future.

If any of the enrolled trainees is not appearing for the immediate examination, for any reason, the training institute must inform Examination Authority at the time of sending application forms of candidates of that batch.

4. **Eligibility of Repeater Candidates (Resit):**

Any candidate who has failed in any of the previous examination or missed an examination should follow instructions given in DGS Training circular No. 13 of 2013.
Repeater candidates if they desire, may choose to forward the application form to the Examination Authority themselves or through the Training institute within the dates specified on the website of the Examination Authority.
A repeater candidate shall comply with Para (b) of Training Circular no.2 of 2008, dated 12.02.2008 with regard to number of attempts.

5. **Disciplinary action against candidates:**

Guidelines for disciplinary action in cases of unlawful act of any candidate during 'All India Exit Examination for Ratings' conducted by the examination authority.

Definition: Examples of 'Unlawful act'.

(A) Possession of prohibited material
(B) Exchanging anything with other candidates
(C) Attempt to copy from a candidate from an adjacent seat
(D) Causing disturbance in the examination hall,
(E) Impersonation.
(F) Or any similar means.

I) If the candidate is caught at the venue of the examination:

The invigilator would collect the evidence, as far as possible, and report the matter to the Examination Coordinator immediately.

The invigilator shall write a report of the incidence and submit it to the Examination Coordinator. The candidate should be asked to sign the statement.

In case of no physical evidence, and a candidate refuses to sign, the Examination Coordinator shall make a remark on the report and forward the report, with or without the evidence, to the Chief Coordinator of the authorised examination body.

II) In case the copying is noticed at the time of marking of answer scripts.

The examiner or the moderator finding any evidence of copying shall report the matter to the Chief Coordinator as soon as possible.

III) Further action:

If the evidence of cheating is confirmed, the Examination Authority shall declare the candidate(s) as failed. Any candidate who attempts to copy or is helping others to copy will be treated equally.

IV) Impersonation:

If a candidate engages other person in the act of impersonation and it is confirmed by the examination body, the candidate shall be debarred from appearing the examination permanently.

Examination Enquiry Report (Sample)
(In case of unlawful act during the Exit Examination)

Date, place & time of Event:

Persons involved:
Names & Roll No:

Name of the institute:

Allegation: Details of 'unlawful act'.

Evidence:

Statement from the candidates: (Add or delete as applicable)

The evidence presented is true/……...

I agree to have adopted unfair means during the examination as stated above.

I disagree to have adopted unfair means during the examination as stated above. (Agree or disagree to be written by the individual candidate in signature column.)

Names	Signature
Head of Institution	
Remarks (if any)	
Representatives of Examination Authority 1. 2.	

Date: Place:

Annexure 7

FORMAT OF PASSING OUT CERTIFICATE

Institute Logo

NAME OF THE ACADEMY
ADDRESS

Phone:(+91xx)_____ Fax:(+91xx)_____ E-mail:_____

PRE SEA TRAINING COURSE FOR GENERAL PURPOSE (GP) RATINGS

This is to certify that _____ Roll No. _____ D.O.B. (DD,MMM,YYYY) *INDos No. _____ has successfully completed a Pre Sea Training Course for Rating forming part of the Navigational and Engineering Watch from _____ to _____. This course is an integral part of the overall planned and structured training programme for the prospective Rating of a Sea going Ship of 500 gross tonnage or more and is designed to assist him in achieving the minimum standards of competence as specified in Regulation II/4, II/5 and III/4, III/5 of STCW convention as amended in 2010. This training programme was conducted in English language and is approved by the Directorate General of Shipping, Ministry of Shipping, Government of India.

Colour Photograph 40 mm X 30 mm

Rubber Stamp of Institute

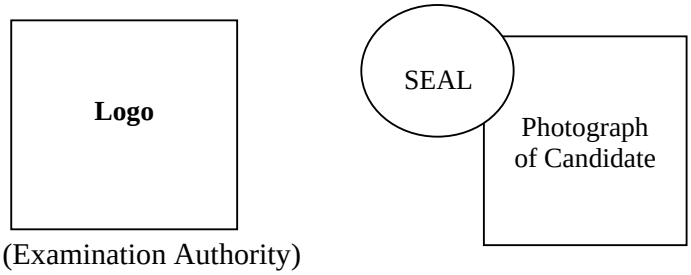
Embossed seal of Institute

Rating's Signature ***Date of Issue*** ***CAPTAIN SUPERINTENDENT/PRINCIPAL***

*Indian National Database of Seafarers

All enquiries concerning the certificate should be addressed to the issuing authority above.

Sample of a Certificate to be issued on passing the All India Exit Examination



(Examination Authority)

Under the authority of the Directorate General of Shipping, Ministry of Shipping, Government of India

Awards this

Certificate

Certificate No.: Candidates Code/year/Roll No.

This is to certify that SSSS KKKK YYYY

Roll No. XXXX **INDOS No.** YYYY **Date of Birth** DD-MMM-YY

has undergone an approved 25 weeks Pre-sea training Course for

General Purpose Rating

at: (Name of Training institute)

From MM-YY to MM-YY , **and has successfully passed the All India Exit Examination held in (Month – Year) and has been awarded grade** - **on the basis shown below:**

A	B	C
80% and above	70-79.99 % marks	60-69.99 % marks

Position in the merit list of first 25% -

Signature of the Candidate

Dated: DD-MMM-YY

Sd/
Head of Examination Authority
(Name)

(Name of Examination Authority)
Address

Sample of Endorsement at the back of GP Rating Certificate

The All India Exit Examination is conducted in accordance with DG Training Circular XX of 2018 for assessment of competencies as defined in STCW A-II/4, A-II/5, A-III/4 and A-III/5 and in compliance with regulations II/4, II/5, III/4 and III/5 of STCW as amended in 2010

The curriculum for pre-sea training programme includes following components:

Part 1	Maritime English and General Ship Knowledge
Part 2	Navigation at Support Level
Part 3	Cargo Handling and Stowage at Support Level
Part 4	Marine Engineering at Support Level
Part 5	Electrical, electronic and control engineering at Support level
Part 6	Controlling the Operation of Ship and Care for persons on board at Support Level
Part 7	Maintenance and Repair at Support Level
Part 8	Mandatory STCW Courses and Ship Visit
	A. Proficiency in Survival Techniques *
	B. Elementary First Aid *
	C. Fire Prevention and Fire Fighting *
	D. Personal Safety and Social Responsibility *
	E. Security Training for Seafarers with Designated Security Duties *
	F. Ship Visit / Harbour Visit *

*Mandatory courses for General Purpose Rating pre-sea training.

Under the All India Exit Examination, conducted by the Board of Examination for Seafarer Trust, each candidate is evaluated through an online examination, practical skill assessment with oral test for Parts 1 to 7. To pass the examination, a candidate must obtain the minimum marks as prescribed for each component. Results are evaluated by the Directorate General of Shipping prior to issue of this certificate to successful candidates.

Mark Sheet of the Candidate

S.No.		Full Mark	Pass Mark	Marks obtained
1.	Part 1 +2 +3 +6	75	45	
2	Part 4 +5 + 7	75	45	
3	Part 1 +2 +3 +6 Practical with Oral	175	105	
4	Part 4 +5 + 7 Practical with Oral	175	105	

Annexure 8

Uniforms for faculty members

1. **Epaulettes**
   1.1. Instructor: One Stripe.
   1.2. Senior Instructor: Two stripes.
   1.3. Nautical Rating: A diamond and four stripes.
   1.4. Engineer Rating: A diamond and four stripes with purple in between.
   1.5. Senior Nautical Rating, if post exists in institute: A diamond and a broad stripe.
   1.6. Senior Engineer Rating, if post exists in institute: A diamond and a broad stripe with purple in between.
   1.7. Course in charge (If Master Mariner) – Title: Captain Superintendent: A diamond, one stripe and a broad stripe.
   1.8. Course in charge (If MEO Class I) – Title: Engineer Superintendent: A diamond, one stripe and a broad stripe with purple in between.

   Note 1: Each stripe to be approximately 10 mm broad. The broad stripe to be approximately 45 mm broad.
   Note 2: The diamond shape on the epaulette is only for an rating who possesses a Certificate of Competency granted or recognised by the Government of India.

2. **Caps**
   2.1. All faculty members: White peak Cap.
   2.2. Senior Nautical Rating and Senior Engineer Rating: White peak cap with one row of golden laurels.
   2.3. Captain Superintendent: White peak cap with two rows of golden laurels.

3. **Uniform**
   3.1. White half-sleeve shirt with epaulettes, white trousers, white belt, white socks and black shoes.
   3.2. In cold weather, black trousers, black belt and black socks may be substituted for white.
   3.3. White full-sleeve shirt may be worn after sunset in mosquito prone areas.

Annexure 9
List of Equipment (GP Rating)

Infrastructure, Equipment and teaching aids for Seamanship-Navigation-Engineering

The following facilities of suitable area commensurate with the number of trainees at a time**:**

- **Navigation**
- **Seamanship**
- **Marine Engineering**
- **Carpentry**
- **Plumbing**
- **Turning, Machining, Fitting**
- **Electrical**
- **Hot work**

Open air demonstration, and practice area keeping in mind convenience of assessment (Specifications for work benches, size of vices, ventilation, safe movement, and lighting)

		For 40	**For 80**	**For 120**	**For 160**
1.	**General Equipment to include:**				
1.1	World Maps (one in each Class Room and one in the library)	1	1	1	1
1.2	Minimum 3 models of Ships	1	2	3	3
1.3	Wall-mounted Photographs of Ships and Ports	10	10	10	10
1.4	Mate's Log Book	2	2	4	4
1.5	Official Log Book	2	2	4	4
1.6	Articles of Agreement	2	2	4	4
1.7	Muster List (one in each class room and one in the corridor)	2	4	4	4
1.8	Various plans of ships (GA/Fire control/LSA/Capacity/ loadline)	1 each	1 each	2 each	2 each
1.9	Gangway register	1	2	2	2
1.10	Rest Hours Record	1	2	3	4
1.11	Computers (Word /Excel training) sets	20	20	40	40
2.	**Video CD's/DVDs to include:**				
2.1	Personal Safety on Deck	1	1	1	1
2.2	Personal Safety in Galley	1	1	1	1
2.3	Personal Safety in Accommodation	1	1	1	1
2.4	Personal Safety in Engine room	1	1	1	1
2.5	Shipboard Maintenance and Painting Systems	1	1	1	1
2.6	Anchors and Cables	1	1	1	1
2.7	Safe Mooring Practice	1	1	1	1
2.8	Good Bunkering Practices	1	1	1	1
2.9	Tank Cleaning	1	1	1	1
2.10	Entry into enclosed spaces	1	1	1	1
2.11	Use of Breathing Apparatus	1	1	1	1
2.12	Operation and maintenance of hatch covers	1	1	1	1

		For 40	For 80	For 120	For 160
2.13	Pollution Prevention	1	1	1	1
2.14	Shipboard Oil Spill Contingency Planning	1	1	1	1
2.15	Waste and Garbage Management	1	1	1	1
2.16	Bridge Watch Keeping Procedures and Routine	1	1	1	1
2.17	Understanding English on Board - Normal Operations	1	1	1	1
2.18	Understanding English on Board – Emergencies	1	1	1	1
2.19	Good housekeeping on deck	1	1	1	1
2.20	Good housekeeping in engine room	1	1	1	1
2.21	Good housekeeping in accommodation	1	1	1	1
2.22	Permit to work systems and safe working practices	1	1	1	1
2.23	Working Aloft and Working Overside	1	1	1	1
2.24	Use of Personal Protective Equipment	1	1	1	1
2.25	Safe Welding and Gas Cutting Practice	1	1	1	1
2.26	Hold Cleaning Procedure	1	1	1	1
2.27	Correct use of Hand Tools	1	1	1	1
2.28	Using Power Tools	1	1	1	1
2.29	Safe rigging of gangways, pilot ladders	1	1	1	1
2.30	Working with Lifting Gear	1	1	1	1
2.31	Safe Slinging	1	1	1	1
2.32	Hazards at Sea	1	1	1	1
3.	**Navigation Equipment to include:**				
3.1	Wet Card Magnetic Compass in a binnacle	1	1	1	1
3.2	Gyro Compass with repeaters	1	1	1	1
3.3	Model of Steering Wheel with Helm Indicator	1	1	2	2
3.4	Beaufort Scale Wind and state of Sea Chart	2	2	4	4
3.5	Binoculars.	2	2	4	4
3.6	Azimuth Circle	1	2	2	2
3.7	Aneroid Barometer	1	1	1	1
3.8	Mason's Hygrometer in a Stevenson's Screen	1	1	1	1
3.9	Whirling Psychrometer	1	1	2	2
3.10	VHF model	1	1	1	1
3.11	MOB Marker (dummy)	1	1	2	2
3.12	Navigation Lights Sentinel	1	1	1	1
3.13	Walkie-Talkie	2 sets	2 sets	2 sets	2 sets
3.14	Steering Simulator (PC based)	1	1	2	2
3.15	International Code of Signals Flags (B, G, H, P, & Q)	2 sets	2 sets	2 sets	2 sets
3.16	Day signals	1 set	1 set	1 set	1 set
3.17	Aldis Lamp with battery	1 set	1 set	1 set	1 set
3.18	Flag locker	1 set	1 set	1 set	1 set
3.19	Tide Tables set	1	1	2	2
4.	**Seamanship Equipment to include:**				
4.1	A ship-type mast as per DGS order no: 7 of 2016.	1	1	1	1
4.2	Manila Ropes [various sizes]	Sufficient for each trainee to be able to carry out ropework and splicing			
4.3	Synthetic Ropes [various sizes]				

		For 40	For 80	For 120	For 160
4.4	Steel wire Ropes [various sizes]	exercises			
4.5	Seizing twine and seizing wire				
4.6	Heaving Lines	4	4	8	8
4.7	Rope and chain stoppers	4	4	8	8
4.8	Anchor (Stockless) with D-shackle	1	1	1	1
4.9	Anchor Shackle and Kenter Shackle	2 each	2 each	4 each	4 each
4.10	Lugless joining shackle for anchor chain	2	2	4	4
4.11	Mooring Shackle	2	2	4	4
4.12	Mooring Hawser (30 fathoms)	2	2	4	4
4.13	Mooring Wire (30 fathoms)	2	2	4	4
4.14	Bollards & Bits	2	2	4	4
4.15	Mooring winch with a warping drum	1	1	1	1
4.16	Rat guards	2	2	4	4
4.17	Single, double and triple sheave blocks	2 each	2 each	4 each	4 each
4.18	Cargo Block, gin block 5 ton	1	1	2	2
4.19	Snatch Block	2	2	4	4
4.20	Bottle screws and turn buckles	4	4	8	8
4.21	Bulldog Grips	12	12	24	24
4.22	Differential Pulley (chain block)	2	2	4	4
4.23	Container fittings including lashings : • Long Bar (Eye & Plug Type) • Short Bar (Eye & Plug Type) • Manual Twist locks (RHL & LHL 1 each), • Semi-Automatic Twist locks • Automatic Twist locks • Bridge Fittings • Turnbuckles (Hook & for Plug Type 1 each) • Lashing Turnbuckle tightener (2 types for above) • Actuator Pole • One Container on ISO Sockets **preferred** / Welded Corner Casting at a Height for practice securing to lashing Eyes/ Plates at ground level.	 2 2 1 1 1 1 1 1 1 1 1	 2 2 1 1 1 1 1 1 1 1 1	 2 2 1 1 1 1 1 1 1 1 1	 2 2 1 1 1 1 1 1 1 1 1
4.24	Chipping hammers, scrapers and wire brushes	20 sets	20 sets	40 sets	40 sets
4.25	Paint Brushes, roller brushes [various sizes and types] (1”, 2”, 3”, 4”)	12	24	36	48
4.26	Paint trays	12	12	18	18
4.27	Spray painting machine (with set of nozzles), and self-contained compressor, hose and attachment. (face mask, gloves, goggles)	1 set	1 set	2 sets	2 sets
4.28	Paints for practice (primer, enamel, polymer) 20 ltr tins each	1	2	3	4
4.29	Impeller (for mixing of paint)	1	1	2	2
4.30	Chipping machine with accessories with compressed	1 set	1 set	2 sets	2 sets

		For 40	For 80	For 120	For 160
	air supply system				
4.31	Life-jackets and life-buoys of approved type (in working condition)	12+2	12+2	24+2	24+2
4.32	Set of dummy distress signals	2	2	2	2
4.33	Pilot ladder rigged up for practice	1	1	2	2
4.34	Rope / coolie ladder rigged up for practice	1	1	2	2
4.35	Bosun's Chair (with self-lowering arrangement)	2	2	4	4
4.36	Overside Stage (with paint brush & ladder)	2	2	4	4
4.37	Safety Harness	4	4	8	8
4.38	Fall arrestor (FPD)	2	2	3	3
4.39	Marline Spikes	4	4	8	8
4.40	Wooden Spikes (fid and mallet)	4	4	8	8
4.41	Slings, - Snotter, net sling, endless rope sling, drum clamps, pallet	2 each	2 each	2 each	2 each
4.42	Sounding Rod with line	2	2	4	4
4.43	UTI tape	1	1	1	1
4.44	Ullage tape	1	2	2	2
4.45	Sounding tapes (Steel)	2	2	4	4
4.46	Fabricated manhole and its cover	2	2	2	2
4.47	Enclosed space (for enclosed space entry through manhole)	1	1	1	1
4.48	Scupper plugs	4	4	4	4
4.49	Coloured Garbage bins for different items as on board	1 set	1 set	2 sets	2 sets
4.50	SOPEP Locker equipment	1 set	1 set	1 set	1 set
4.51	5m telescopic ladder	1	1	2	2
4.52	Water finding paste	2	4	6	8
4.53	Hatch cover section with coaming, hatch cover and cleats	1	1	1	1
4.54	Mandel / Tonsberg shackle	1	1	1	1
4.55	Pedestal roller	1	1	1	1
4.56	Working life vest	2	2	4	4
4.57	Cargo Hold Booby hatch	1	1	1	1
4.58	De mucking winch	1	1	1	1
4.59	Gangway / accommodation ladder and Gangway net	1	1	1	1
4.60	Types of vents (various types)	1	1	1	1
4.61	Types of fenders (one each)	1	1	1	1
4.62	Pilot ladder Repair steps	2	2	4	4
4.63	Winnets for pilot ladder (chocks)	10	10	20	20
4.64	Paint remover	20 ltr	20 ltr	20 ltr	20 ltr
4.65	Stag horns and cleats	1	1	1	1
4.66	Turn buckle with senhouse slip	1	1	1	1
4.67	Jubilee clips (assorted)	24	24	36	36
4.68	Hydraulic cutter	1	1	2	2
4.69	Pneumatic Needle Guns	4	4	8	8
4.70	Pneumatic Scrappers	2	2	4	4
4.71	Watertight door, with frame	1	1	1	1

		For 40	For 80	For 120	For 160
4.72	Swing derrick / boom	1	1	1	1
4.73	Saws – Straight, hack and fret (1 each)	2 sets	2 sets	4 sets	4 sets
4.74	Various Wood chisels	2 sets	2 sets	4 sets	4 sets
4.75	Various wood files	2 sets	2 sets	4 sets	4 sets
4.76	Breast braces and other clamps	4	4	4	4
4.77	Hand Drilling machine with hand drill bits	2	2	2	2
4.78	Masonry Punches	1 set	1 set	1 set	1 set
4.79	Portable electric drill and its bits including masonry bits	2	2	4	4
4.80	Wood screws and nails different sizes				
4.81	Jack plane	2	2	4	4
4.82	Oil (20 Ltrs) Grease (20 Ltrs)	1 1	2 2	3 3	4 4
4.83	Scaffolding and accessories for a height of 3 metres	1	1	1	1
4.84	Rescue Tripod for enclosed spaces	1	1	1	1
4.85	Ventilator with ducting for enclosed spaces	2	2	2	2
4.86	Wire Brush Machines	2	2	4	4
4.87	Sanding Machine	2	2	2	2
4.88	Elcometer (measuring Wet Film thickness)	2	2	2	2
4.89	Water tight door rubber packing (5m) Glue tins	1 1	1 1	1 2	1 2

Engineering Workshop Equipment

List of equipment given below is with assumption that only half the number (20) from each batch of 40 will be in the engineering workshop at one time, remaining 20 will be involved in other activities.

		For 40	**For 80**	**For 120**	**For 160**
1.	**Fitting Shop**				
1.1	Work Bench 1200-2400-900 mm without vice	4	4	8	8
1.2	Work Bench 1200-2400-900 mm with four vices of two different sizes (100 mm to 150 mm wide parallel jaw)	4	4	8	8
2.	**Hand Tools**				
2.1	Hammers (ball pein) 150 gms, 200 gms,	4 each	4 each	8 each	8 each
2.2	Hammer 500 gms	1	1	2	2
2.3	Claw Hammer 200 gms	3	3	6	6
2.4	Sledge Hammer 1 kg, 3 kg & 5 kg	1 each	1 each	2 each	2 each
2.5	Files flat – bastard, medium and fine cut (30 mm) (with wooden handles)	6 each	6 each	12 each	12 each
2.6	Files flat – medium and fine cut (25 mm) (with wooden handles)	6 each	6 each	12 each	12 each
2.7	Files half round; triangular, square	5 each	5 each	10 each	12 each
2.8	Needle files	1 set	1 set	2 sets	2 sets
2.9	Flat Chisels 200 mm length & 150 mm length	4 each	4 each	8 each	8 each
2.10	Chisel – caulking, diamond	2 each	2 each	2 each	2 each
2.11	Spanners double open ended - 6 to 36 mm	4 sets	4 sets	8 sets	8 sets
2.12	Ring Spanners - 6 to 36 mm	4 sets	4 sets	8 sets	8 sets
2.13	Adjustable spanners - 200 mm & 300 mm	2 each	2 each	4 each	4 each
2.14	Box Spanners 12 points and 6 points with ratchet spanner	1 set each	1 set each	1 set each	1 set each
2.15	Allen Keys 1 mm to 10 mm, 1/16 to 3/8 inches	2 sets	2 sets	2 sets	2 sets
2.16	Screw drivers (various sizes) (minus and Phillips)	12	12	24	24
2.17	Hack Saw Frame (standard)	6	6	12	12
2.18	Hack Saw frame small	3	3	6	6
2.19	Reamers 10 mm & 12 mm	1 set	1 set	1 set	1 set
2.20	Round Hole Punch	2 sets	2 sets	2 sets	2 sets
2.21	Center Punch	8	8	16	16
2.22	Letter Punch	2 sets	2 sets	2 sets	2 sets
2.23	Thread Extractor	4	4	4	4
2.24	Measuring Tape	2	2	4	4
2.25	Crow Bar	4	4	8	8
2.26	Male / Female Couplings (various types) for water line and pneumatic line	1 set	1 set	2 sets	2 sets
2.27	Hook spanner wrench	4	4	4	4
2.28	Flat nose plier	4	4	8	8
2.29	Water pump plier	4	4	4	4

		For 40	For 80	For 120	For 160
2.30	Tongs	5	5	10	10
2.31	Hand snip	4	4	4	4
2.32	Plastic hammer	4	4	4	4
2.33	Wooden mallet	4	4	8	8
2.34	Cloth scissor	4	4	8	8
2.35	Gasket and washer cutter	4	4	8	8
2.36	Gland packing hook	4	4	4	4
2.37	Steel scriber	4	4	4	4
2.38	Gear and wheel puller - 2 legs and 3 legs	1 each	1 each	1 each	1 each
2.39	Tube cutter	2	2	4	4
2.40	C - clamps	8	8	16	16
2.41	Hydraulic Jacks	2	2	2	2
3.	**Instruments**				
3.1	Steel Scales - 300 mm & 1000 mm	10	10	20	20
3.2	Try Squares - 150 mm & 300 mm	6	6	12	12
3.3	Straight edge - 300 mm	2	2	4	4
3.4	Vernier calipers - 0 -150 mm, 0-300 mm	4 each	4 each	8 each	8 each
3.5	Micrometer (Outside) 0-25 mm, 25-50 mm, 50 -300 mm	4	4	8	8
3.6	Micrometer (inside) 50 – 300 mm	1	1	2	2
3.7	Simple calipers (inside and outside type)	5 each	5 each	10 each	10 each
3.8	Dividers	8	8	16	16
3.9	Die Nuts - M6 to M22	1 set	1 set	2 sets	2 sets
3.10	Hand Taps - M6 to M22	2 sets	2 sets	2 sets	2 sets
3.11	Thread pitch gauge	2	2	2	2
3.12	Feeler Gauge small	2	2	2	2
3.13	Feeler Gauge large	2	2	2	2
3.14	Circlip plier - internal and external	2 each	2 each	2 each	2 each
4.	**Machines**				
4.1	Pedestal grinder or a bench grinder independently Mounted	4	4	4	4
4.2	Vertical Drill Machine	8	8	16	16
4.3	Electric Portable Drill	5	5	10	10
4.4	Drill bits up to 10 mm	4 set	4 sets	8 sets	8 sets
4.5	Lathe complete with basic accessories (in working condition)	8	8	16	16
4.6	Lathe tools for turning, cutting, boring and parting	6 each	6 each	12 each	12 each
5.	**Plumbing Tools to include:**				
5.1	Grip pliers	8	8	16	16
5.2	Pipe Vice	8	8	16	16
5.3	Pipe Wrench, (large and small)	6 each	6 each	12	12

		For 40	For 80	For 120	For 160
				each	each
5.4	Water taps with washers,	4	4	8	8
5.5	Taps and dies ½ - 2 inch, for cutting threads on pipes, etc.	4 set	4 set	8 set	8 set
5.6	Unions, bends, couplings	24 pcs	24 pcs	48 pcs	48 pcs
5.7	Pipes for practice various lengths	20 m	40 m	60 m	80 m
5.8	Valve packing material				
5.9	Teflon thread tape				
5.10	Sanisnake	1	1	1	1
6.	**Lubrication**				
6.1	Oiling can with a hand pump	4	4	8	8
6.2	Spouted oil cans three sizes	1 set	1 set	2 sets	2 sets
6.3	Hand Grease gun with different types of adaptors	4	4	8	8
6.4	Pneumatic grease gun	1	1	2	2
7.	**Electrical Tools to include:**				
7.1	Insulated hand tools normally used by electricians	4 each	4 each	8 each	8 each
7.2	Multimeter and megger	2 each	2 each	2 each	2 each
7.3	Fuse cartridges, and circuit breakers samples	3 each	3 each	3 each	3 each
7.4	Various types of electrical connections - samples				
7.5	Soldering irons, solder, flux.	2	2	4	4
7.6	Tester	5	5	10	10
7.7	Portable grinder (straight)	2	2	4	4
7.8	Portable grinder (angled)	2	2	4	4
7.9	Lock-out-Tag-out kit	1	1	1	1
8.	**Hot work equipment to include: (Working condition)**				
8.1	Oxy-acetylene gas cutting/welding apparatus and its accessories (including personal protective gear) (approved type)	4 sets	4	8	8
8.2	Electric arc welding machine and its accessories (including personal protective gear)	8 sets	8	16	16
8.3	Adequate mild steel material for practice of cutting and welding. (3mm, 6mm plates, angle iron,)				
8.4	Electrodes in stock for use by candidates				
9.	**Pumps and Valves**				
9.1	Centrifugal Pump (vertical & horizontal), (mounted with electrical motor)	1 each	1 each	1 each	1 each
9.2	Centrifugal pump multi stage	1	1	1	1
9.3	Reciprocating Pump	1	1	1	1
9.4	Gear Pump	1	1	1	1
9.5	Vane Pump Optional	Optional			
9.6	Screw Pump	1	1	1	1

		For 40	For 80	For 120	For 160
9.7	Hand pump (rotary)	2	2	2	2
9.8	Globe Valve a) Return b) Non Return	2 each	2 each	2 each	2 each
9.9	Gate/Sluice Valve	2	2	2	2
9.10	Butterfly Valve	2	2	2	2
9.11	Quick Closing Valve	2	2	2	2
9.12	Storm Valve	1	1	1	1
9.13	Safety Valve	1	1	1	1
9.14	Reducing Valve	1	1	1	1
9.15	Ball Valve	1	1	1	1
9.16	Float valve	1	1	1	1
9.17	Tapered Cock (small and medium size)	2 each	2 each	2 each	2 each
9.18	Cylindrical cock	2	2	2	2
10.	**Filters**				
10.1	Fuel Oil Filter (M/E) (complete) Duplex type	2	2	4	4
10.2	Fuel oil filter (felt type) (complete)	2	2	4	4
10.3	Lube Oil Filter (M/E) (duplex) (complete)	2	2	4	4
10.4	Lube oil filter for auxiliary engine (complete)	2	2	4	4
10.5	Air Filter of Turbo charger	2	2	4	4
11.	**Gauges**				
11.1	Level gauge for tanks	1	1	1	1
11.2	Pressure gauge	3	3	3	3
11.3	Thermometer of various sizes and range	6	6	6	6
11.4	Pyrometers	3	3	3	3
11.5	Sounding tape	2	2	2	2
11.6	Sounding rod	2	2	2	2
11.7	Boiler Gauge Glass (mounted model)	1	1	1	1
11.8	Boiler Gauge Glass (for practice of dismantling)	1	1	1	1
12.	**Diesel Engine Components**				
12.1	Fuel Injector (M/E)	1	1	1	1
12.2	Fuel Pump (M/E)	1	1	1	1
12.3	Cylinder Relief Valve (M/E)	1	1	1	1
12.4	Air Starting Valve (M/E)	1	1	1	1
12.5	Air Distributor (M/E)	1	1	1	1
12.6	Indicator Cock (M/E)	1	1	1	1
12.7	Cylinder Lubricator (M/E)	1	1	1	1
12.8	Cylinder Lubricator Quill (M/E)	1	1	1	1
12.9	Piston Rod Stuffing Box (M/E)	1	1	1	1
12.10	C/Case Relief Valve (M/E)	1	1	1	1
12.11	Scavenge Valve (M/E)	1	1	1	1
12.12	Cylinder Liner (Aux/E)	1	1	1	1
12.13	Cylinder Head (Aux/E)	1	1	1	1
12.14	Piston with Rings (Aux/E)	1	1	1	1

		For 40	For 80	For 120	For 160
12.15	Connecting Rod (Aux/E)	1	1	1	1
12.16	Bottom End Bearing with (Aux/E) Bolts and Nuts	1	1	1	1
12.17	F.W/Lub. Oil Cooler	1	1	1	1
12.18	Aux. Air Receiver	1	1	1	1
13.	**Compressor, Centrifugal Separator, etc.**				
13.1	Main Air Compressor (marine type)	1	1	1	1
13.2	Lub. Oil/D.O/H.O. Separator	1	1	1	1
13.3	Boiler safety valve (complete)	1	1	1	1
13.4	Bilge Strum Box (complete)	1	1	1	1
13.5	Hydraulic Jacks, 1000 kg	1	1	1	1
13.6	High Pressure Washing machine for general cleaning, paint removal, descaling and hydro blasting	1	1	1	1
14.	**Posters for tools, instruments, engines, pumps, valves, protective gear, safety signs**	One each	One each	One each	One each
15.	**Models**				
15.1	Boiler	1	1	1	1
15.2	Diesel Engine	1	1	1	1

Annexure 10

Additional in-house safety equipment required where the modular courses are outsourced:

1) Demonstration Table
2) One inflated life-raft on display.
3) Complete set of Life Raft Equipment
4) Complete set of Life Boat Equipment
5) Two Immersion Suits
6) 10 lifejackets
7) 4 Thermal Protective Aids
8) 1 roll Retro reflective Tapes
9) 1 Hydrostatic Release Unit (HRU)
10) 4 Lifebuoys
11) 1 Man Overboard Marker
12) 4 Self-igniting Lights
13) 1 EPIRB (Model)
14) 1 SART (Model)
15) 2 Neil Robertson Stretcher
16) 4 First Aid Kit
17) Various splints & bandages
18) 1 Resuscitation Kit
19) One Emergency Escape Breathing Apparatus (EEBD)
20) Ten earmuffs
21) Four dust masks
22) One Explosimeter / Multi-gas detector
23) One Oxygen analyser
24) One Hydrocarbon detector.
25) One UTI tape.
26) One ullage tape.
27) Two dummies for search and rescue procedures
28) Four fire hoses – 64 mm
29) Four nozzles (2 jet, 2 dual purpose)
30) Two mechanical foam guns
31) Four pressurized water extinguishers
32) Four foam extinguishers
33) One 4.50 kg. D.C.P. extinguisher
34) One 10 kg D.C.P. extinguishers
35) Two 6.8 kg CO2 extinguishers
36) Sufficient refills for all types of extinguishers
37) A working model of fire & general alarm
38) Two sets of self-contained breathing apparatus, complete with spare cylinders, spare parts and maintenance tools
39) Two sets of protective clothing for firemen
40) Four life lines
41) Fire Axe – (2)
42) Fire torch – (2)
43) Dragger pump and tubes – (1) with set of 10 tubes
44) Fire wallet – (1)
45) Hose Coupling (different types) – 1 set

APPENDICES

Appendix 1A

Part 1: Maritime English & General Ship Knowledge

Parts/Title	T Hrs	P Hrs Skill hours	Total Hrs	Wks
Part 1 – Maritime English & General Ship Knowledge.	**55**	**30**	**85**	**2.02**

S. No.	Topics & sub topics	Theory	Practical
1.1	**Induction to the course, personality and communication skills development, general knowledge about shipping and ships, and introduction to computers**	**2**	
1.2	**General Aspects of Shipping** 1.2.1 Importance of Shipping in the National and International Trade 1.2.2 International Routes 1.2.3 Types of Ships and Cargoes 1.2.4 Shipboard Organization	**10**	**0**
1.3	**Computers (Familiarization)**	**7**	**12**
1.4	**Discipline, etiquettes and Gender Sensitization**	**5**	**1**
1.5	**Health and Hygiene**	**3**	**1**
1.6	**Maritime English - English communication by use of Standard Marine Communication Phrases (SMCP). Reading of Safety Instructions, charts etc.** (It is understood that the trainee has an elementary knowledge of English and is able to communicate using simple English sentences and basic vocabulary. In case the trainee is observed to be weak in English language, he/she shall undergo a General English training prior continuing with this course)	**15**	**12**
1.7	**Nautical Terms – Parts of the Ship (Using ship models and video)** 1.7.1 Hull 1.7.2 Ships Decks 1.7.3 Fore Castle 1.7.4 Poop Deck 1.7.5 Accommodation: (Teaching Aid: Video) 1.7.6 Bridge:(Teaching Aid: Video) 1.7.7 Monkey Island 1.7.8 Cargo Spaces (Cargo Holds, Tanks) 1.7.9 Cargo Handling Gear (Derricks, Cranes, Grabs, Pumps) 1.7.10 Machinery Space (Engine Room/Pump room)	**13**	**4**
	TOTAL	**55**	**30**

Specific Learning Objectives – General Aspects of Shipping

1.1	Induction to the course, personality and communication skills development, general knowledge about shipping and ships		

The trainees will be able to understand :

1.1.1 **Purpose of the GP Ratings course**

1.1.2 Importance of a good confident personality and good communication skills

1.1.3 Importance of Shipping in the National and International Trade and the International Sea Routes

1.1.4 History of maritime trade in India

1.2	**General Aspects of Shipping**		

The trainee will be able to:

1.2.1 Importance of Shipping in the National and International Trade

State the role of shipping in the national and international trade.

1.2.2 International Routes

The trainee will be able to:

Using a World Map (without labels) or Globe, name and identify location of continents, and oceans.

State international sea routes for ships.

1.2.3 Types of Ships and Cargoes:

Trainee will be able to:

Differentiate between Types of Merchant Vessels as mentioned below:

State the use of each Type of ship

State the Type of Cargo carried by each Type of Vessel.

Basically 2 types of Ships exist namely Passenger & Cargo. Cargo Ships are further subdivided into Dry Cargoes and Wet Cargoes as per Table below:

Types of Ships				
Cargo Ships				**Passenger Ships**
Dry Cargo		Liquid Cargo		Cruise Liner
		Type of Ship / Type of Cargo		
General Cargo	General Cargo (eg :) Boxes, Machinery, etc	Oil Tankers	Oil	Ferries
Container Vessel	Containers	Chemical Tankers	Chemicals	
Bulk Carriers	Bulk Cargoes, (Ore, Grain, Coal, Cement, etc)	Gas Tankers	Liquefied Gases	
Roll On –Roll Off Vessel	Trucks, trailers, Cars and other vehicles			
Other ships: Tug Boats, Offshore supply vessels				

1.2.4 Shipboard Organization

Trainee will be able to state that:

- There are two Distinct Departments on the Ship
- These Departments are ***Nautical Department*** and ***Engineering Department***
- Nautical Department is responsible for Cargo Operations, Navigation of the vessel and General Maintenance of the Ship and Administration
- Engineering Department is responsible for Upkeep and Maintenance of all Machinery onboard Ship and the propulsion system
- Each Department consists of Ratings and ratings
- Nautical Department consists of Master, Chief Rating, 2/0, 3/0, Cadet or Apprentices and Able Seafarers (Deck), Watch-keeping deck ratings or GP ratings
- Engineering Department consists of Chief Engineer, 2/E, 3/E, 4/E, Electro-Technical Rating, Electrical Rating, Electro-Technical Rating, Electricians or Fitter and Able Seafarers (Engine), Watch-keeping EOWs or GP ratings
- Master is overall in charge of the ship
- Catering Department includes Catering Rating, Chief Cook & General Steward (G.S.) who are responsible for cooking food for Ratings and Crew and general cleanliness in accommodation.

1.3	**Computers (Familiarisation)**		

The trainee will be able to: (minimum expected learning).

1.3.1 Identify basic components of a PC: CPU, Monitor, keyboard, mouse, and state their purpose.
1.3.2 Identify keys on the keyboard and their functions: space bar, shift, return, ctrl, arrows, caps lock,
1.3.3 Start and log on a computer
1.3.4 Demonstrate use of a keyboard and mouse for given tasks, using a self-learning module, starting and stopping a power point programme and a video.
1.3.5 Take a simple assessment on a computer (multiple choice questions).
1.3.6 Using Microsoft Word, Excel, and Power Point or their equivalents.
1.3.7 Learn to send e-mails, Use Internet, Fill up on-line forms (e.g. Seafarers Profile on DGS Website)

1.4	**Discipline, etiquette and Gender Sensitization**		

The trainee will be able to:

1.4.1 Demonstrate aspects of discipline and etiquettes in performance of duties, routines, given tasks.
1.4.2 Table manners and eating etiquette.
1.4.3 Change behavior & instill empathy into his views about his own & the other gender.

1.5	**Health and Hygiene**		

The trainee will be able to:

1.5.1 State importance of maintaining personal health and hygiene.

1.5.2 States ways and means of maintaining good health.
1.5.3 State personal habits and conditions that lead to illness of an individual on board.
1.5.4 Maintenance of Cleanliness and hygiene on Board ships in the accommodation, Cabins, alleyways, toilets, Galleys, Pantries, Mess-rooms and provision stores.

1.6	**Maritime English – English Communication by use of Standard Marine Communication Phrases (SMCP), reading of safety instructions and charts.** Speaking, reading, writing (using topics 1.2 and 1.7, charts and reading material)		

The trainee will be able to:

1.6.1 Oral communication:
Comprehend and answer questions related to his duties, types of ships, action in emergencies, terms related to parts of the ship, machinery in the engine room, and as expected in a visit of a Port State Control rating in a ship inspection.

1.6.2 Ability to read and comprehend:
Read given handouts and instructions related to safety and duties on board ship.

1.6.3 Ability to write:
Copy and write legibly the given text from the text book or handouts for the course. Answers questions given in the written examination. (Spelling of simple terms, and basic grammar is expected.)

1.6.4 Ability to draw
Sketch simple components of equipment used on board, such as: anchor, bollard, spindle, piston, etc.

Instructor should refer to IMO Model Course 3.17, Maritime English, to the IMO Marine Standard Communication Phrases.

Additional Sessions:
The Institute should conduct special classes / use special means / interactive sessions / Videos / Power-point presentations / Multi-media sessions particularly for those students who are weak in written or spoken English. This shall be outside the normal Class Hours. Use to be made of an English Lab using appropriate self-learning softwares.

1.7	**Nautical Terms – Parts of the Ship (Using ship models and video)**		

Nautical Terms – Parts of the Ship:
Trainee will be able to Name / Identify a part of the Ship given in the following sketches and state its purpose:-

1.7.1 Hull:
Shipside, Name of the Ship, Port of Registry, Stern, Propeller, Rudder, Draft marks, Load-line Marks, Bulbous Bow marks, Bow Thruster marks, Stem, Forecastle, Anchor, Hawse Pipe, Poop Deck,

1.7.2 Ships Deck:
Forward, Aft, Amidships, Portside, Starboard Side, Forecastle, Poop Deck, Derricks, Cargo Winches, Cranes, Cargo Holds, Hatches, Bulwarks, Railings, Sounding Pipes, Air Pipes, Filling

Pipes, Bollards, Main Mast, Fore Mast, After Mast, Hold Ventilators, Gangway, Pilot Ladder, Scuppers, Tank domes, manhole & Covers, Cargo & Ballast lines.

1.7.3 Fore Castle:

Windlass, Brake Handle, Warping Drum, Spurling Pipe, Hawse Pipe, Bow Stopper, Devil's Claw, Chain Stopper, Rope Stopper, Heaving Line, Mooring Hawsers, Mooring Wires, Headline, Back–Spring, Breast Rope, Fair Leads, Panama Lead, forepeak stores, Rat guards, Jack staff, Ship's Bell, Anchor Ball, Anchor, Anchor Shackle, Joining Shackle, Chain-locker, Walkie-talkie.

1.7.4 Poop Deck:

Mooring Winch, Stern Line, After Back Spring, Breast Rope, Chain Stopper, Rope Stopper, Mooring hawser, Mooring Wires, After Peak, Steering Flat, and Accommodation, Walkie-talkie.

1.7.5 Accommodation

Bridge Front Bulkhead, Port holes, Alleyways, Rating's cabins, Passenger's cabins, crew cabins, Dining Rooms, Smoke rooms, Washrooms, Toilets, Pantry, Galley, Laundry, Storeroom, Cold storage, water-tight doors, Boat deck, Lifeboats, Life raft, Railing, Ship's funnel.

1.7.6 Bridge

Steering Wheel, Gyro Compass, Magnetic Compass, Radar, V.H.F, Engine Room Telegraph, Rudder Angle Indicator, Anemometer, Whirling-Psychrometer, R.P.M Indicator, Ship Whistle/Siren, Light Sentinel, Man Overboard Marker, Chart Room, Side Lights, Clear-View Screen, General Alarm, P.A. System (Public Address), Radio room – Equipment, EPIRB.

1.7.7 Monkey Island

Magnetic Compass, RADAR Scanner, Flag Mast, Halyards, Funnel, Ship's Whistle / Siren or Whistle.

1.7.8 Cargo Spaces:

Cargo Holds, Hatch Coamings, Hatch Openings, Hatch Covers, Hatch Boards, Hatch Beams, Tween Decks, Hold Bilges, Tank Top, Double-bottom Tanks, Manhole Covers, Cargo Tanks.

1.7.9 Cargo Handling Gear:

Derrick, Cargo Winch, Cranes, Grabs, Gantries, Spreaders, Slings, Cargo Pumps

1.7.10 Machinery Spaces (Engine Room, Pump Room)

Location of Engine Room: Existence of Entrance doors, Emergency escape routes. Location of steering gear. Location of pump room on tankers.

Appendix 1B

Specific Learning Objectives
Part 2 Navigation at Support Level (A-II/4 & A-II/5)

Title	Theory Hrs	Practical Hrs Skill Hrs	Total Hrs	Wks
Part 2 Navigation at Support Level (A-II/4 & A-II/5)	**28**	**60**	**88**	**2.10**

S. No.	Topics & Sub topics	T	P
2.1	**Basic Navigation.** 2.1.1 Navigation Terms 2.1.2 Sea and Port Watch Systems 2.1.3 Rules of the Road (elementary) & Buoyage 2.1.4 International Code of Signal & Flags 2.1.5 Look Out Duties 2.1.6 Reporting to OOW on sighting 2.1.7 Reporting to OOW on hearing 2.1.8 Relieving the Look-Out Man: 2.1.9 Other Bridge Duties	**12**	**20**
2.2	**Information required to maintain a safe watch; Operate emergency equipment & apply emergency procedures** 2.2.1 Navigational aids on the Bridge of a Modern Cargo ship 2.2.2 Operate emergency equipment on bridge & apply emergency procedures 2.2.3 Position of a vessel on a chart 2.2.4 Weather data and tides and their effects	**8**	**6**
2.3	**Steer the Ship & Comply with Helm Orders in the English language** 2.3.1 Magnetic and gyro compass 2.3.2 Helm Orders 2.3.3 Change over from automatic to hand steering and vice versa, NFU	**4**	**20**
2.4	**Berthing, Anchoring and Other Mooring operations** 2.4.1 Mooring system and related procedures 2.4.2 Mooring to a buoy or berth **4.3.1** Anchoring Terms and procedure	**4**	**14**
	Total	**28**	**60**

2.1.Basic Navigation:

Trainee will be able to State that:

2.1.1. Navigational Terms

- Position of a Vessel is found by intersection of Latitude & Longitude on a chart.
- Latitude is measured from 0^o to 90^o North or South
- Latitude 0^o is called Equator
- Latitude 90^o North is called North Pole
- Latitude 90^o South is called South Pole
- Latitude lines run East –West and are parallel to each other
- Latitude is expressed in degree and minutes North or South
- Each degree consists of 60 minutes
- Each minute of Latitude on Equator is one Nautical Mile
- Longitude is measured 0^o to 180^o E and 0^o to 180^o W
- Longitude is expressed in degrees East or West
- Longitude lines run North and South, and are parallel to each other

2.1.2 Sea and Port Watch Systems & Contribute to a safe watches

In implementing the section of this course, the instructor should ensure that the trainees have prior and adequate training and experience as ratings and have demonstrated the ability to perform tasks as required of ratings.
Ability to understand orders and to communicate with the rating of the watch (OOW) on matters relevant to watch keeping duties.
Familiar use of important nautical and technical shipboard terms.

Instructor should refer to IMO Model Course 3.17, Maritime English, to the IMO Marine Standard Communication Phrases and to the references given in Part C1 of this course.

- Procedures for the relief, maintenance and handover of a watch
- On completion trainees will know the sea and harbour watch systems. Maintenance, handover and relief of the watch are in conformity with accepted practices and procedures.
- Knowledge of the sea and port watch systems
- Instructors can refer to the following basic requirements for watch keeping:
- The bridge watch keeping is maintained 24 hours a day, no matter at sea or at anchor.
- The navigation watch is usually divided into 4-hour periods.
- In order to ensure navigation safety, the Master should decide the watch keeping standard level according to the actual navigational situation. Navigational watch keeping standards can be divided into three watch keeping Levels.
- Level 1: Good visibility, ocean/coastline navigation, low density of traffic: one OOW and one Deck Rating forming part of the watch, auto piloting;
- Level 2: Navigating in a restricted area, moderate density of traffic: one OOW (if necessary Master on bridge), two Deck Ratings (one of them assisting in lookout), hand steering;
- Level 3: Navigating in restricted visibility, high density of traffic or in a restricted area: Master commanding on bridge, one OOW (if necessary two OOWs), two Deck Ratings (one of them assisting in lookout), hand steering.

- Usual watch keeping schedule
- Chief Rating's watch: 0400 ~ 0800; 1600 ~ 2000
- Second Rating's watch: 0000 ~ 0400; 1200 ~ 1600
- Third Rating's watch: 0800 ~ 1200; 2000 ~ 2400

In port the system of 6 hours watch periods can be adopted.

- Second Rating's watch: 0000 ~ 0600; 1200 ~ 1800
- Third Rating's watch: 0600 ~ 1200; 1800 ~ 2400

Watch keeping personnel on the bridge should be dressed neatly and concentrate on watch keeping and lookout duties. Watch keeping personnel on bridge must be clear that the safety of life and the safety of ship take precedence over all other considerations.

Instructors can refer to the following basic procedures of relief and handover of a watch:

The relieving rating should be on the bridge in advance at least 5 minutes, familiarizing himself with the prevailing circumstances and conditions as well as ship's position, speed, course, steering system and so on;
Before taking over the watch, the night eyes should be obtained by the relieving rating;
The rating should not hand over the watch to the relieving rating if he has reason to believe that the latter is obviously not capable of carrying out his duties effectively, in which case he should notify the OOW;
The watch should never be handed over if the ship was altering course or taking action to avoid collision;
The relieved rating must never leave the bridge until he confirms that the relieving rating has fully understood the vessel`s current situation;
During sailing or anchoring, taking over and handing over the watch should be carried out on the bridge. It is not allowed to change the watch through third party or by telephone;
The watch is not to be relieved in case of emergency or abnormal circumstances without master`s permission.

Instructors can refer to the following basic information required for changing watch

- Other vessels movements in the vicinity;
- Condition of the steering gear and steering system;
- Courses of gyro and magnetic compasses;
- Conditions in cargo holds and regular safety inspections;
- Exhibition of signal flags, lights and shapes;
- Preparations of arrival and departure, e.g. pilot ladder, signal flags, lights, shapes, lightings;
- Tasks instructed by OOW have not been finished.

2.1.3 Rules of the Road (elementary) & Buoyage

Trainee will be able to recognize navigational lights & shapes, identify buoys, Rule of the road with main emphasis with rules from 1 to 19 Describe Day and night signals.

Recognize Lights & shapes to be carried by ships when under way.
Recognize Lights and shapes to be carried by ships when making way through water.

Recognize Lights and shapes to be carried by ships when at anchor and when aground.
Understand Lights and shapes to be carried by ships when :
Not Under Command (NUC), / Restricted in her ability to maneuver (RAM) and
When constrained by draft (CBD).

Recognize Lights and shapes to be carried by ships when engaged in specialized activities.

Recognize Lights and shapes to be carried by Fishing & Trawler vessels.
Recognize Lights and shapes to be carried by Towing/Pushing/dredger vessels.

State the visibility of lights as described in Rule 22.
Understand how to decide when a vessel is overtaking vessel
Understand the application of rules 1 ~ 15.
Explain how to decide when to take avoiding actions as stand on vessel.
Explain the actions which may/ must be taken by stand on vessel.
Understand Rule 18 – Responsibility between vessels – its application.
Define 'traffic lane', 'separation lane/ separation zone /inshore traffic zone'.

Sound and light Signals – Definitions, Equipment for Sound Signals
Understand the sound signals to be used by vessels in sight of one another including
Maneuvering and Warning Signals.

Understand the sound signals of various vessels during restricted visibility.

Explain the principles and rules of the International Association of Lighthouse Authorities (IALA), Maritime Buoyage System, Systems 'A' and 'B'.

2.1.4 International Code of Signal & Flags

Trainee will be able to:

- Hoist any combination of Flags on the Halyards
- Identify and state the meaning / usage of the Single letter Flags
- Stitch flag on a lanyard and attach flag clip

Trainee will be able to explain that:

- Courtesy flag is the Flag of the Foreign Country, in which the ship is presently situated
- Courtesy Flag is hoisted outboard on the starboard yard arm of the main mast
- House Flag is the flag of the Shipping Company and is hoisted on the Main Mast
- The Ensign Flag is the flag of the Country where Ship is registered
- In port the Ensign Flag is hoisted on Ensign Staff, which is right aft
- Flag clips are used to join two or more flags, to hoist on a halyard
- Emergency duties and alarm signals, use of pyrotechnics and distress signals, EPIRBs and SARTs, avoidance of false distress alerts and action to be taken in event of accidental activation

2.1.5 Look Out Duties:

A Lookout man on duty will:

- Stand in the Bridge Wings in an assigned place
- Be appropriately dressed for the weather, by warm clothes, gloves, rain coat etc.

- Keep an all-round look out by sight & hearing
- Report any sighting and hearing of any sound signals to the Rating on duty
- Sound signals, lights and other objects are promptly detected and their approximate bearing, in degrees or points, is reported to the rating of the watch

2.1.6 The Sighting to Report will be:

By Day: All Ships, Boats, Floating Objects, Land and the relative direction in which sighted.
By Night: All Lights with their colour, and the relative direction in which sighted.

Examples of Reports to be made by the Lookout Man would be as Follows:

- A White flashing light, two points forward / abaft the Starboard Beam, Sir.
- A Boat, 2 points on the Port Bow, Sir.
- A Ship Right Ahead, Sir.
- A Buoy, 3 points on the Starboard Bow, Sir.
- Loom of a White flashing light, Right Ahead Sir.
- Red lights on the Port Bow, Sir
- Several White lights Right Ahead, Sir
- Sound signal 4 points on Port Bow.

2.1.7 The Hearing to Report will be:

By Day or Night: All Sounds and the external relative direction from which emanating.
Example:

- Points on Port Bow
- Points on Stbd Bow

2.1.8 Relieving the Look-Out Man:

Trainee will state that before relieving the previous lookout Man he would do the following:

- Be appropriately dressed to suit the weather (Rain Coat, Caps, Woolens and Gloves etc.)
- Arrive on the bridge 15 minutes before time
- Get acclimatized to the weather and the darkness
- Check the courses being steered and report to Duty Rating
- Compare the Gyro Compass & Magnetic Compass
- See what Ships / Lights / Buoys are in sight.
- Receive any special instruction if any, from previous lookout man
- Inform Duty rating that you have taken charge.

Information required to maintain a safe watch

- Assist with analyzing of movement of different vessels
  - Identifies and understands the sound, light and flag signals pertaining to ships' operations and maneuvers
  - determines the time with respect to the time units used on board and convert local time in the respective time zones
  - recognizes the purposes of the individual instruments on the bridge (GPS and radar) and is able to assess the values displayed and to integrate them in the tasks of his watch duty
  - reads course, depth, and speed data from the nautical instruments (gyro and magnetic compass, echo sounder, and speed logs)

- Take and correct course data (4 hours)
  - describes the direction of the ship's head on a gyro-compass (gyro course)
  - describes the direction of the ship's head on a magnetic compass (compass course)
  - compares readings of magnetic and gyro compasses
  - Knows the compass error and can apply corrections to courses and bearings.
- Recognize the special characteristics of the landmarks
  - identifies landmarks and navigational aids and understand their purposes
  - identifies the characteristics of lights by observation
- Assist with collection and documentation of weather data
  - can observe the sea waves and swell and estimate the sea state as per Beaufort scale
  - can take readings of thermometer, barometer, psychrometer and hygrometer
  - can observe and estimate the cloud cover

2.1.9 Other bridge duties.

2.2 Information required to maintain a safe watch; Operate emergency equipment & apply emergency procedures

2.2.1 Navigational Aids available on the Bridge of a Modern Cargo ship

Trainee will be able to recognize Navigational Aids on the Bridge and explain its usage. Recognise the purpose of the individual equipment on the bridge and interpret the values displayed.

Recognize the purposes of the individual equipment on the bridge and interpret the Values displayed and integrate them in the tasks of watch duty

It is the instructor’s duty to teach basic knowledge of purpose of other navigation devices:

- RADAR - Explain the basic working of Marine Radar with the block diagram
- COURSE RECORDER- Explain the working of a course recorder.
- ECDIS- Explain different display modes, ECDIS symbols, ECDIS alarms etc.
- VHF and GMDSS, e.g. VHF routine communication channels, concept of GMDSS etc.
- GPS - Explain "Global Navigation Satellite Systems" (GNSS).
  as a system of position fixing using earth-orbiting satellites that broadcast their locations to receiver units which in turn calculate the ground position based on that Explain basic systems are GPS / GLONASS/ GALILEO.
- Describe World Geodetic System 1984 (WGS 84) as a terrestrial reference system geodetic datum which is the used by the GPS satellites for position fixing.
- LOG - Explain Speed Log principle and operations of Doppler, electromagnetic logs
- AIS- Explain that 'Automatic Identification System (AIS) is a
  mandatory equipment fitted on ships and shore-
  stations, purpose of which is to enhance Maritime Safety, Security and
  Protection of the marine environment through automated exchange of information.

State that, AIS through its automatic exchange of data (ship-to-ship and with shore-based stations), helps to identify and track vessels; exchange mandory information (Ship Reporting function) and provide additional information to watch keeper to improve his situational awareness

- ECHO-SOUNDER - Explain Echo Sounder, its principle and working.
- OTHER EQUIPMENTS - State the concept and purpose of LRIT, VDR/ S-VDR, and BNWAS

Knowledge of the nautical publications that is carried on board.

The trainees should be aware that nautical charts are used for navigating a ship. Various nautical publications provide information to the navigator to assist in planning the navigational voyages.

Read course, depth, and speed data from the nautical instruments

It is the instructor's duty based on the already provided explanation of the navigation devices to teach the following:

- Magnetic Compass, e.g. how to read and report
- Gyro Compass, e.g. how to read and report
- ECHO-SOUNDER, e.g. how to read and report
- Speed log, e.g. how to read and report

It is the instructor's duty to teach basic knowledge of function and basic use of main steering system, steering gear together with changeover procedures between AUTO (pilot), FU (follow up or hand) and NFU (non-follow up). Also the trainees should be able to interpret the values displayed on magnetic and gyro compass and understand their significance.

- Read course data and notify rating on watch

The trainees should be able to read and report the ship's heading on magnetic compass and gyro compass.

2.2.2 Operate emergency equipment on bridge & apply emergency procedures

Operate emergency equipment on bridge and apply emergency procedures

- Knowledge of emergency duties and alarm signals
- Knowledge of pyrotechnic distress signals; satellite EPIRBs and SARTs
- Avoidance of false distress alerts and action to be taken in event of accidental activation
- The integrity of emergency and distress alerting systems is maintained at all times
- Procedure for emergency messages Safety / Urgency / Distress Explain the proper procedure to use a walkie-talkie and VHF set. The importance of minimal use of airtime.

2.2.3 Position of a vessel on a chart

The trainee should know the terms:

- 'earth's pole', 'equator', 'meridians', 'latitude', 'parallels of latitude', 'prime meridian' and 'longitude' and be able to identify them on a chart;
- International nautical mile / cable / knot.- Explain 'Sea Mile', and 'Nautical mile', , comparison of nautical mile with kilometre,'cable' and explanation of 'knot' as a unit of speed.
- The trainees should be able to identify landmarks and navigational aids with understanding of their purposes on a Mercator chart
- Explain with diagrams: 'latitude' and 'parallels of latitude', 'prime meridian and 'longitude'.
- Locate Oceans, Continents, Seas, Canals, Straits, Navigable Rivers, and Major ports of the world.
- Explain the following: Time and hour angle, , Greenwich time, Local time, zone time and standard time. Keeping time at sea, advancing and retarding of clocks with change of Longitude, International Date Line
- Describe Course Steered, Course Made Good, Leeway, Leeway Track, Dead Reckoned and Estimated Positions.
- Define 'natural scale' of a chart
- Explain Types of charts: Small Scale, large scale, meteorological charts, Routeing charts, Harbour- charts etc
- Define a position.
- Measure the distance between two positions on a Mercator chart.
- Determine a position by a combination of bearing, distance

2.2.4 Weather data and tides and their effects

It is the instructor's duty to teach how to use meteorological instruments:

Thermometers for ambient air and water surface temperatures

- Stevenson screen
- Psychrometer
- Barometer
- Barograph
- Anemometer

Be aware of tides and their effects

- The trainees should be aware the depth of water near the coast is affected by diurnal change of tides.
- Describe the basic theory of tides.
- Define spring tide / neap tide / height of tide / high water / low water / mean high water springs mean high neaps / mean low water springs / mean low water neaps / tidal range & chart datum'.

2.3 Steer the Ship & Comply with Helm Orders in the English language

2.3.1 Magnetic and gyro compass

It is the instructor's duty based on the already provided explanation of the navigation devices to teach the following:

- Magnetic Compass, e.g. how to read and report
- Gyro Compass, e.g. how to read and report

Trainee will be able to State that:

- Name the Cardinal Points
- Name the Inter Cardinal Points
- Name the Three letter Points
- Name the By Points
- Box the Compass from One Point to Another.
- Convert Degree to Points & Vice Versa
- All Ships carry Gyro Compasses & Magnetic Compasses
- The Gyro Compass runs on Electricity
- Magnetic Compasses do not need electricity, but are directed by the Earth's magnetism.
- Gyro repeaters are fixed at steering platform, bridge wings, etc.
- Applying Gyro Error

2.3.2 Helm Orders

- Understand the Helm Orders given to him
- Repeat the Orders given to him
- Communications are clear and concise at all times and orders are acknowledge in a seamanlike manner.
- Implement/Carry out the orders given to him
- A steady course is steered within acceptable limits, having regard to the area of navigation and prevailing sea state. Alterations of course are smooth and controlled.
- Confirm that the Orders have been carried out / implemented
- List the Helm Orders as follows:

Starboard	Port
Starboard Easy	Port Easy
Starboard 5	Port 5
Starboard More	Port More
Starboard 10	Port 10
Starboard 20	Port 20
Hard Starboard	Hard Port
Ease the Helm	Ease the Helm
Mid Ship	Mid Ship
Steady	Steady
Steady as she goes	Steady as she goes
Nothing to Starboard	Nothing to Port

Trainee will be able to explain in detail the procedure for 'Relieving a Helmsman'.

2.3.3 Change over from automatic to hand steering and vice versa, NFU

- Change over from Hand Steering to Auto Pilot and vice versa

It is the instructor's duty to teach basic knowledge of function and basic use of main steering system, steering gear together with changeover procedures between AUTO (pilot), FU (follow up or hand) and NFU (non-follow up). Also the trainees should be able to interpret the values displayed on magnetic and gyro compass and understand their significance.

2.4 Berthing, Anchoring and Other Mooring operations

2.4.1 Mooring system and related procedures

Contribute to berthing, anchoring and other mooring operations

In implementing the section of this course, the instructor should ensure that the trainees have prior and adequate training and experience as ratings and have demonstrated the ability to perform tasks as required of ratings with special reference to rope work

Mooring system and related procedures / Working knowledge of mooring and tug lines and how eachline functions as part of an overall system.

The trainees shall master the handling of winches and ropes used in the mooring and unmooring in a harbour, in the warping and anchoring of ships. Hereby they use the communication rules, including the hand signs, and the measures for the safety at work.

The trainees achieve working knowledge of mooring line systems and related procedures and fully understand the following terms:

- Spring line: to control the ship's ranging movement.
- Breast line: to control the ship's lateral movement.
- Head/stern line: general control of both ranging and lateral movements including any yawing.
- Buoy line: sent out from the head or stern of the vessel to connect the front-end eye splice of the line with the buoy ring, to provide holding power for the vessel.
- Slip line: usually sent out from the head of the vessel, through the buoy ring and back to the head of the vessel again, with both ends fastened on the vessel, so that the unmooring of the line can be controlled by the crew.
  It is slack and does not provide holding power during mooring.

Heaving line: a type of lightweight line used on board ship to establish a connection with people in another ship, people on the shore, or shipmates who have gone overboard. These lightweight ropes are typically weighted at one end, classically with a monkey's fist knot, and they are very easy to throw across long distances.

Stopper: used to transfer the weight of the mooring rope from the winch to the bitts or vice versa. Two types of stoppers are in common use, rope and chain: rope stoppers are used in the handling of fiber mooring ropes, chain stoppers are used in the handling of wire mooring ropes.

Rat guard: a disk of sheet metal fitted around a hawser to prevent rats from boarding a vessel moored at a dock.

Snap back zone: Use of lines of different material and the danger associated with them, safety precautions to be taken.

Working knowledge of capacities, safe working loads, and breaking strengths of mooring equipment, including mooring wires, synthetic and fibre lines, winches, anchor windlasses, capstans, bitts, chocks and bollards
It is the instructor's duty to explain the definitions of the specific values SWL, WLL and MBS as listed below and transfer them into rules and procedures to use installations, e.g. winches, windlasses etc. together with the mooring equipment, e.g. mooring wires, synthetic lines etc.

(SWL) Safe working load: It is generally considered to be the breaking load of a component divided by an appropriate factor of safety giving a 'safe' load that could be lifted or be carried. Safe working load is 1/6 of breaking strength in general, and is 1/10 or less of breaking strength when using it to hoist a person.

(WLL) Working load limit: The maximum mass or force which a product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centreline of the product. The WLL of a component is specified by the manufacturer.

(MBS) Minimum breaking strength: MBS is the minimum amount of force required to break an object, often referred to as tensile strength or breaking strength

The trainees should have working knowledge of the characteristics of different types of mooring and tug lines. The elasticity and breaking stress of various types of mooring lines vary based on the material of the mooring ropes.

Working knowledge of procedures and order of events for making fast and letting go mooring and tug lines and wires, including towing lines.

The trainees achieve professional knowledge of mooring/unmooring operations, related procedures, respective safe working practice and fully understand the following:

Before arrival

- Checking condition of messenger, heaving line, stopper and mooring ropes;
- Testing mooring winches;
- Checking condition and SWL of winches, fairleads, chocks and bollards and maintain mooring equipment in good condition;
- Non-slip mooring deck to be maintained.

During operation

- Laying out mooring rope, preparing heaving line and stopper, standby one spare heaving line;
- Giving signal to linesman when sending heaving line ashore;
- Getting permission to send the first line;
- Repeating orders and report to bridge on every operation carried out;
- Controlling mooring rope speed when paying out/heaving up;

- Ensuring mooring ropes keep clear of fenders, bow thruster and propeller;
- Monitoring stress of mooring rope, adjust as required;
- Monitoring crew position in relation to mooring ropes, to keep clear of mooring rope during slack/heaving up. Keep clear of snap-back zone;
- Monitoring vessel movement/clearance, report useful information to bridge.
- Being able to perform in accordance with established safety practices the necessary activities for the preparation and carrying out of a pilot change and deploying a pilot ladder for the change of pilot, as well as berthing and un-berthing.
- Being able to identify leads, bitts and connections suitable for towing, understand the use of a messenger in taking, giving or receiving a towing line or other heavy duty line, secure and let go tug lines, make use of the communication rules, including hand signs, and apply the necessary rigging works (knots and splicing) safely in the context of good seamanship.

Watch keeping duties with respect to mooring

- Keeping watch at the gangway;
- Assisting the duty rating in cargo operation (hatch cover opening / closing, sounding, securing cranes);
- Adjusting the mooring lines or ropes.
- The trainees shall achieve working knowledge of tug line systems and related tug operation procedures and fully understand the following:
- Before arrival
- Checking condition of messenger, heaving line, stopper and mooring rope;
- Testing capstan, mooring winch, non-slip mooring deck to be maintained;
- Checking condition of winch, fairlead, chocks and bollards.

During operation

- Rating in charge keeping communication with tug boat by hand signals;
- Ensuring tug line to be clear of bow thruster and propeller;
- Monitoring stress of tug line and heaving line;
- Monitoring crew's position in relation to tug's line, keeping clear of heaving line during heaving up, keeping clear of snap-back zone;
- Reporting to bridge when tug line make fast/cast off.

2.4.2 Procedures and order of events associated with mooring to a buoy or buoys

Working knowledge of the Procedures and order of events associated with mooring to a buoy or buoys

The trainees should be aware of the purpose of mooring to a buoy, related procedures, respective safe working practice and fully understand the following:

A mooring buoy is a type of buoy, to which, ships can be moored in the deep oceanic areas. A mooring buoy weighs more than the general type of buoys.

The mooring buoy is designed in a manner that there is a heavier weight located right in the bottom of the sea. This weight is like an anchor holding the buoy afloat in the water. A mooring buoy has loops or chains attached to its top that floats on the water. These chains are provided so that ships or boats can be effectively moored to them. The entire application of a mooring buoy works in such a way that the buoy is floating while the ships are moored to a very firm support

without using the anchor system of halting a ship. In some parts of the world, mooring buoys are also used to moor boats and ships away from areas where coral reefs thrive.

Ships using mooring buoys to protect coral reefs do so because when the traditional types of anchors are used, they tend to dig and uproot the coral that lie deep under the water surface. This would cause a huge loss to the marine ecosystem. By using a mooring buoy, two purposes are served – the ships are moored appropriately and the loss to the marine life-forms is prevented. Such mooring buoys in coral reef areas are located mainly in Australia, Asia and also in some parts of the United States.

Mooring to a buoy by use of ship's anchor chain

- Preparation for mooring to a buoy:
- Preparing the tools & equipment.
- Hanging off the anchor, allowing sufficient space in the hawse pipe for the buoy chain to pass through smoothly.
- Connecting the heaving–in wire to fluke of anchor;
- Lowering the anchor and simultaneously start heaving in the above wire afterward;
- Making fast the above anchor, then secure adequate length of chain to the deck.
- Walking back the anchor chain laying down on deck until the first joining shackle (kenter shackle) is reached.
- Uncoupling the joining shackle (kenter shackle), utilizing a taper-pin punch and a shackle-pin punch, removing the taper-pin and then cutting (split) off.
- Connecting a buoy shackle with and link to the anchor chain.
- Fixing the hanging off wire of the anchor chain to the 6th or 7th link from the end link.
- Lowering the chain adjusting the hanging wire of & to ensure no tangling.
- Securing the hanging wire to bollard after being lowered to within a few meters above water.
- Securing the anchor chain with a bit of slack (windlass brake on and clutch off).
- Lowering the shackle pin immediately before connecting the buoy shackle to buoy.
- Preparing the buoy rope (hawser).
- Preparing the slipping wire.

Buoy mooring

- Sending the buoy rope (hawser) to the buoy and heaving in the rope until the buoy is right under the ship's bow.
- When the buoy under the ship's bow, lowering the hanging wire with buoy hackle adjusting and connecting the anchor-shackle to the buoy.
- Lowering the anchor chain to an adequate distance from the buoy.
- Casting off the buoy rope (hawser).
- Sending the slipping wire to the buoy.

Releasing buoy chain

- Heaving in the buoy chain until the buoy comes under the ship's bow.
- Heaving in the slipping wire simultaneously until the same condition of the above and securing it to the bollard.
- Slacking the buoy chain slightly and releasing the buoy shackle.
- Heaving in the anchor chain to the deck.
- Casting off the slipping wire.

Connecting anchor

- Confirming the chain not being twisted, connect the anchor chain again with a kenter shackle which was removed.
- Resuming heaving in the anchor chain slowly and simultaneously slack the heave-in wire rope for anchor.
- Connecting the anchor.

Single buoy mooring (SBM)

SBM or single point mooring system is a method by which only the bow of a vessel, particularly for liquid cargo carriers, is moored to buoy or fixed structure allowing the vessel to swing freely in all directions. Thus, the ship can stay at the berth with minimum tension to the mooring rope.

Tools and equipment needed :

- Messenger rope (30mm~32mm diameter and 100 meter length) 2 pieces.
- Utility ropes.
- Large sized bar.
- Hammers, sennit, seamans-knife, grease, cotton waste.

Preparation

Vessels are moored with two synthetic fiber ropes to which a piece of short chafing chain is connected at the end so that the mooring lines may not wear out by contact with the fairlead. The short chain is tied up to the bow chain stopper of the vessel.

Freeing the winch drum for hauling in a pickup hawser, and fit a messenger rope to the drum (not applicable to a ship equipped with an exclusive winch for SBM).

Lowering a messenger rope close to sea level to pick the SBM hawser.

Then heaving up the messenger rope and towing rope, and heave in the slack with care, as the SBM comes closer.

Making SBM rope fast

The Smit Bracket and bow chain stopper methods are two ways to make fast a mooring rope to SBM.

Unmooring from SBM

Testing the winch without load, then heave the pick-up wire until the chafe chain is clear of the chain stopper.

Freeing the stopper and then lower the chain wire, towing rope one by one up to the connection of the messenger rope comes to lie on deck.

Casting off all buoy ropes.

2.4.3 Working knowledge of procedures and order of events for the use of anchors in various operations

The trainees should have working knowledge of anchoring operations, related procedures together with respective safe working practice.

Explain the following terms in connection with anchor work: cable, link, swivel, joining shackle, shackle as a term of length, bitter end, A'cockbill (anchor ready for letting go), anchor aweigh, clear hawse, foul hawse, clear or foul anchor, dragging, long stay, short stay, up and down, to veer cable, weighing anchor, yawing, brought up to three in water / four on deck, etc.

The trainees should identify and report the lead and tension on the anchor cable when at anchor. The trainees should be also able to identify the number of shackles dropped by reading the markings on the anchor cable.
Explain Anchor work. Describe the parts of a windlass

Explain the method for securing anchor for sea, covering
Spurling pipe, marking on anchor cable, use of chain hook, describe how anchors should be kept ready for use in emergency.

Appendix 1C

Cargo Handling and Stowage at Support Level (A-II/5)

Specific Learning Objectives

Parts/Title	T Hrs	P Hrs Skill hours	Total Hrs	Week
Part 3 Cargo Handling and Stowage at Support Level (A-II/5)	**16**	**40**	**56**	**1.33**

		Theory	Practical
3.1	**3.1 Cargo Handling** 3.1.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) 3.1.2 Cargo Spaces, Opening & Closing of Hatches 3.1.3 Securing Cargoes 3.1.4 Container Cargo 3.1.5 Bulk Cargo (Other Than Grain) 3.1.6 Bulk Grain Cargo 3.1.7 Preparation of Holds and Segregation of Cargoes 3.1.8 Ventilation and Control 3.1.9 Refrigerated Cargo	**10**	**20**
3.2	**3.2 Handling of Stores** 3.2.1 Handling gear for lifting stores 3.2.2 Communication signals during handling of stores 3.2.3 Segregation of stores and spares 3.2.4 Lashing and securing of stores	**4**	**18**
3.3	**3.3 IMDG Cargo** 3.3.1 Identification of dangerous goods and placarding 3.3.2 Precautions for their carriage	**2**	**2**
	Total	**16**	**40**

3.1.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps)

Trainee will be able to state that:

- States the detailed information which is contained in Code of Safe Practice for Cargo Stowage and Securing (CSS Code) and all cargo stowage and securing should be in accordance of CSS Code and Cargo Securing Manual (CSM)
- States the need for solid stow and securing of all cargoes
- Demonstrates methods of blocking, lashing, shoring, chocking and tombing cargo under supervision of duty rating
- Demonstrates methods of securing cargo faces resulting from part discharge before making a sea passage under supervision of duty rating
- Demonstrates methods of securing heavy loads and heavy lifts under supervision of duty rating
- Demonstrates methods of stowing and securing vehicles and trailers under supervision of duty rating
- Describes the safe loading/discharging of ro-ro cargoes

- Demonstrates securing unitized, containers, trailers, portable tanks and other cargo in accordance with the ship's cargo securing arrangements manual
- States that hatches should be securely closed and cleated before loading over them
- States that stowage should leave safe access to essential equipment and spaces needed to navigate and operate the ship
- Demonstrates rigging guard lines or rails at the sides of a deck stow and at openings in the stow
- Cargo can be loaded/ discharged from the ships by use of ship’s Derricks
- Derricks can be used to load / discharge by a single derrick (Swinging Derrick)
- Cargo runner wires of both derricks can be joint together (Union Purchase)
- Pedestal cranes and twinning of cranes
- Gantry cranes & spreaders are used on container ships
- Safe working Load is marked on the cranes and derricks
- SWL should never be exceeded
- There should be a signal-man to guide the winch / crane operator
- Use and understand Land signals, during operation of derricks and cranes
- Winch / crane operator, should be thoroughly proficient in handling controls
- Cargo gear must be examined and overhauled frequently
- Care and maintenance of cargo gear on board
- Correct use of slings, snotters, canvas slings, trays, pallets, nets, chain slings, cant hooks, bale hooks and vehicle slings
- Knows that all ropes and wires come with a certificate of their properties
- Precautions to be taken when fork-lift trucks or similar devices are used in the 'tween-decks or holds
- Limitations of the lifting gear and knowledge of limit switches
- All cargo gear and equipment to be visually inspected before and during cargo operations
- Provision of adequate lighting for working spaces, portable lights, cargo clutters in hold and precaution with dangerous cargoes
- Understands that cranes should not be used for dragging
- Identifies SWL of shackles, chains and slings correctly

3.1.2 Cargo Spaces, Opening & Closing of Hatches

Trainee will be able to state that:

- Cargo is carried in the holds of the ship
- Each hold has a coaming about one meter high, to prevent water going in the hold
- Each Hold has an opening in the center called 'Hatch'
- Cargo is loaded / unloaded through this 'hatch'
- 'Hatch Cover' is a steel platform that makes the hatch a weather tight compartment
- understands how to determine when a cargo runner needs replacing
- states that mechanically or hydraulically operated hatches should be opened or closed by the ship's crew under the supervision of a responsible person
- states that hatch covers are secured by locking devices (cleats) to prevent them moving accidentally
- states that hatch openings shall be securely fenced
- states that no person should stand on top of the coaming or pass or work under a suspended load
- methods of testing weather tightness of hatch covers
- reasons for lack of proper sealing of hatch covers

3.1.3 Securing Cargoes

Trainee will be able to

- knows that detailed information is contained in Code of Safe Practice for Cargo Stowage and Securing (CSS Code) and all cargo stowage and securing should be in accordance of CSS Code and Cargo Securing Manual (CSM)
- understands the need for solid stow and reducing broken stowage
- knows what is stowage factor of various cargoes and how does it affect the quantity of cargo to be carried in a hold.
- methods of blocking, lashing, shoring, chocking and tombing cargo under supervision of duty rating
- methods of securing cargo faces resulting from part discharge before making a sea passage under supervision of duty rating
- methods of securing heavy loads and heavy lifts under supervision of duty rating
- methods of stowing and securing vehicles and trailers under supervision of duty rating
- methods of lashing paper rolls, steel coils, steel billets, crates, plates inside the hold
- methods of lashing timber cargo on deck
- rigging of guard lines or rails at the sides of a deck stow and at openings in the stow

3.1.4 Container Cargo

Trainee will be able to

- Based on and additional to the general securing of cargoes, the instructor's task is to teach the parts of a container to the trainees. It is recommended to use technical drawings first to explain construction, dimensions and technical terms of a typical 20 foot standard container. In a next step the instructor can introduce further sizes and types.
- Modern containers are designed for safe transport and quick loading and discharging but the trainees have to be made aware of loading and lashing procedures together with the checks that have to be made.
- Describes the arrangement of a container ship and explains how the position of a particular container is designated
- Describes the sequence of operations during discharging and loading at a terminal

- States the types and sizes of container in use
- Describes markings and labelling on containers
- Demonstrates that container security seals are intact.
- Knows the lifting gear used to load and unload containers
- Knows the lashing gear used to lash containers

3.1.5 Bulk Cargo (Other Than Grain)

Trainee will be able to

- With regard to bulk cargo it is the instructor's task to focus on this special type of cargo and even more on this special type of merchant vessel. The trainees will understand that due to the nature of different bulk cargoes the bulk carrier has to have special features. The instructor has to explain how a cargo hold has to be prepared for a certain cargo.
- Furthermore the instructor has to emphasise the dangerous properties of different bulk cargoes and the precautions that have to be taken before and when entering or opening a bulk carrier cargo hold. The general function principle and the use of a common atmosphere testing device has to be part of the lessons. The trainees should be aware of that some bulk cargos may liquefy during a voyage which could be dangerous to the safety of the vessel.
- Describes the preparation of cargo holds prior to loading bulk cargoes
- Prepares the cargo hold under the supervision of the duty rating
- Understands that some bulk cargoes may deplete the oxygen content of holds or produce toxic gases and describes the precautions to take before entry of holds
- Understands the hazards and the precautions to take during loading and discharging coal

3.1.6 Bulk Grain Cargo

Trainee will be able to

- A special kind of bulk cargo is grain cargo. It can be shipped in containers but also in bulk carriers.
- Due to the fact the grain is food the preparation and cleanliness of the cargo hold is of utmost importance.
- It also important for the trainees to know that grain often has to be loaded in the bulk carrier using special installations to secure grain in the respective cargo hold. The trainees should be made aware that due to the free flowing properties of grain, the cargo may shift to one side of the hold during rolling of the ship. The trainees have to understand that back on board they have to follow the instructions of the OOW strictly. It is common practice that grain in containers and cargo holds is fumigated with harmful substances. Therefore the cargo holds have to be entered or opened using special safety precautions.
- Understands the technical terms that are used in the International Grain Code
- Describes the cleaning and preparation of holds and decks for the carriage of grain
- Understands that a thorough check for insect or rodent infestation should be made
- Understands the dangers associated with fumigation of cargo holds
- Understands securing arrangements for grain cargo as contained in the International Code for the Safe Carriage of Grain in Bulk (International Grain Code).

3.1.7 Preparation of Holds and Segregation of Cargoes

Trainee will be able to

- Explains the importance of cleaning holds before loading
- Describes how to clean holds after discharge of a general cargo

- Understands that the use of a deodorizing wash may be necessary to remove strong odours from a previous cargo
- Cleaning of bilges and strum box and made clean and dry and covered in the burlap
- Understands the reasons for using dunnage and knows types and sizes of material used for dunnage
- Explains how bilge suctions should be checked for efficient working scuppers and sounding pipes
- Understands the need for the separation and segregation of different cargoes

3.1.8 Ventilation and Control

- Understands the factors involved in the control of sweat by ventilation
- Understands the systems of natural and forced ventilation to minimise the formation of sweat
- Understands that ventilation is also required for the removal of heat, gases and odours.

3.1.9 Refrigerated Cargo

- States how holds and lockers are prepared for loading
- Demonstrates the preparation of the cargo hold under the supervision of the duty rating
- States the need for the pre-cooling of spaces and dunnage to be used
- States examples of cargoes carried chilled or frozen
- States the purpose of compartment temperature recordings

3.2 Handling of Stores

3.2.1 Handling gear for lifting stores

- Stores are important equipment for the operation of the vessel. Stores have to be brought on board and stored properly.
- Stores can be handled with a variety of equipment. It is recommended that the instructor informs the trainees about the typical stores handling equipment which is installed on merchant vessels. The trainees need to know the working principle and operation but also typical repair and maintenance of this equipment.
- With regard to the safe operation of this equipment the trainees have to learn in which way and up to which limits the stores handling gear can be used and they also have to understand use and limitations of the associated equipment.
- It is very important that the trainees achieve the professional understanding that only certified and proper working gear and equipment may be used for stores handling.
- During stores handling holds etc. usually have to be opened. The instructor has to inform the trainees about the involved and often additional risks and about the common safety precautions
- Demonstrates the operation of the hoists/cranes used for handling the ship's stores/spares
- States that each handling gear has its capabilities and limitations
- States that all handling gear and equipment shall be visually inspected
- States that all ropes and wires should come with the certificate of their properties
- States that no person should stand, pass or work under a suspended load
- Describes the provision of adequate lighting for working spaces, portable lights and precaution with dangerous stores

3.2.2 Communication signals during handling of stores.

- Describes the importance of maintaining close communication with the personnel on charge ashore during the handling of stores
- Explain the standard crane signals
- Explain the use of various slings; method of shortening a rope sling

3.2.4 Lashing and securing of stores

- Demonstrates the stowage, lashing and securing the stores/spares safely under supervision of duty rating
- States the classification of dangerous stores
- States the reason and need for segregation dangerous stores
- Describes procedures to follow in event of spillage of dangerous stores

3.3.1 Identification of dangerous goods and precautions for their carriage
Trainee will be able to

- Additional to the already taught different cargo properties, certain cargo has also dangerous properties.
- The instructor has to teach details of the IMDG-Code to an extend that the forthcoming deck ratings easily identify the IMDG labels on cargo, know the main risks, understand that this cargo has to be put exactly at the planned stowing position on board. It will be the deck ratings task to report the OOW any finding or observation especially with regard to dangerous cargo immediately.
- The instructor has to highlight that certain activities are prohibited, such as using open flames and smoking.
- Furthermore the trainees have to have adequate knowledge of common procedures which have to be followed in the event of leakage or spillage of dangerous, hazardous and harmful cargoes and stores.
- Understands the classification of dangerous goods in the International Maritime Dangerous Goods (IMDG) Code
- Identifies the marking, labelling and placarding of dangerous goods as required by the IMDG Code
- Understands the reason and need for segregation of dangerous goods
- Observes the fire precautions which shall be taken when handling dangerous goods
- Describes procedures to follow in event of spillage of dangerous goods.

3.3.2 Precautions for their carriage
Trainee will be able to :

- Identify the Conventions, Codes and publications to refer with respect to the carriage of dangerous, hazardous and harmful cargoes and substances. They should able to able to recognize IMDG labels, placard and associated markings and the need to segregate these goods in accordance with the IMDG Code.
- Have adequate knowledge and understanding on the procedures to follow in the event of leakage or spillage of dangerous, hazardous and harmful cargoes and stores.
- During the practical aspect of training, the instructor should emphasized on the trainees the safe operation and procedures to follow so that the optimum level of results can be obtained, including;
- Recognise markings and labels that indicate stores or cargoes are classified as dangerous goods

- Recognise DG placards and marking of cargo transport units including intermediate bulk containers (IBCs)
- State that dangerous goods are always stowed and segregated in accordance with the IMDG Code
- Describe procedure to follow in event of leakage of dangerous, hazard and harmful stores or cargoes
- State the reasons and need for separation of dangerous, hazardous and harmful stores or cargoes
- State the need to secure dangerous goods and to secure adjacent cargoes
- Check container security seals are intact and not tampered with
- In a simulated work related context, demonstrate basic knowledge of the identification of IMDG labelling in accordance with the IMDG Code.
- Dangerous goods classed under IMDG Code should be marked and labelled, and in addition, dangerous goods which are also marine pollutants must be marked with marine pollutant labels.

Appendix 1D

Specific Learning Objectives
Marine Engineering Knowledge and Practice

Parts/Title	T Hrs	Practical / Skill hours	Total Hrs	Wks
Part 4 Marine Engineering at Support Level (A-III/4 & A-III/5)	**56**	**120**	**176**	**4.19**

Marine Engineering Knowledge & Practice (at support Level)		Suggested (Hrs)	
S. No.	**Topic & Sub topics**	**Theory**	**Practical**
4.1	**Familiarization with duties and Engine Room environment** 4.1.1. Duties of a Trainee Rating in the Engine Room 4.1.2. Engine Room Space 4.1.3. Engine Room Machinery 4.1.4. Auxiliary Machinery 4.1.5. Terms and Symbols used in the engine room 4.1.6. Engine Room watch keeping procedures	**6**	**6**
4.2	**Basic Turning and Fitting** 4.2.1 Hand Tools and Measuring Instruments 4.2.2 Use of bench vice and Filing, marking, tapping tools 4.2.3 Use of Power Tools for grinding and drilling	**4**	**30**
4.3	**Safe working procedures, Tools & instruments** 4.3.1. Safety precautions while working in the engine room 4.3.2. Safety precautions during bad weather 4.3.3. Safety precautions during hot work 4.3.4. Safety precautions while working on electrical equipments 4.3.5. Safety precautions before entering enclosed spaces 4.3.6. Safety precautions during dry dock 4.3.7. Cleaning of engine room bilges, disposal of engine-room waste 4.3.8. Bilge pumping system 4.3.9. Ballasting & de-ballasting system, bunkering procedures 4.3.10. Maintenance work & preservation	**12**	**20**
4.4	**Auxiliary Equipment & maintenance work** 4.4.1. Valves 4.4.2. Pumps and Pumping Systems including ballasting & Deballasting 4.4.3. Joints and gland packing 4.4.4. Filters 4.4.5. Centrifugal separators 4.4.6. Other Auxiliaries	**6**	**20**

	4.4.7. Boiler and Steam System & watch keeping duties 4.4.8. Propeller & shafting 4.4.9. Preservation of equipment in good condition		
4.5	**Identify components of diesel engines listed below:** 4.5.1. Generator Engines 4.5.2. Main Engine	**5**	**4**
4.6	**Compressed air for auxiliary purposes**	**2**	**2**
4.7	**Machines: Grinder, Drill, Lathe**	**2**	**4**
4.8	**Basic welding and cutting**: Arc welding, gas welding, gas cutting	**2**	**4**
4.9	**Lubricants and lubrication**	**1**	**2**
4.10	**Level measuring devices and techniques**	**1**	**5**
4.11	**Lagging and insulation**	**1**	
4.12	**Chemicals on board**	**1**	**2**
4.13	**Steering Gear** 4.13.1. Function of steering gear, check to be made while taking a round in the steering gear compartment 4.13.2. Bow thruster location & importance	**4**	
4.14	**Storage tanks** 4.14.1. Types of storage tanks in the engine room 4.14.2. Purpose & operation of quick closing valves	**2**	**2**
4.15	**Emergencies in the engine room** 4.15.1. Various emergencies in the engine room 4.15.2. Types of audio-visual alarms 4.15.3. Action to be taken on hearing/seeing alarms 4.15.4. Emergency escape routes	**2**	**6**
4.16	**Fire extinguishing equipment in the engine room** 4.16.1. Portable firefighting appliances in the engine room 4.16.2. Fixed firefighting equipment i.e CO_2, Foam, Water Sprinkler, Hyper Mist, Emergency Fire Pump	**2**	**3**
4.17	**Basic Marine Engineering at Support Level** 4.17.1. Engineering Materials & Special Tools used for maintenance of Engine Room main & auxiliary machineries 4.17.2. Watch keeping duties on main & auxiliary machineries including boilers 4.17.3. Working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant 4.17.4. Remote operations & internal communications system	**3**	**10**
	Total	**56**	**120**

Familiarization with duties and Engine Room environment

4.1.1. Duties of a Trainee Rating in the Engine Room

Duties of a Trainee Rating: (1)

- States duties of a rating in the Engine room for assisting in maintenance and watch keeping
- State the person to report to while working in the Engine room.
- Carry out a watch routine appropriate to the duties of a rating forming part of an engine-room watch
- Routine for a rating
- Understand orders and be understood in matters relevant to watch keeping duties
- Minimum standard of Maritime English at the Elementary Level (reference to IMO model course 3.17) to be able to understand orders and be able to communicate with the rating of the watch in matters relevant to watch keeping duties.

4.1.2. Engine Room Space

- Describe engine room spaces – platforms (levels) –
- Boiler –
- Main engine cylinder head platform
- Generator platform
- Bottom platform
- Funnel trunk
- Tank top
- Pipe tunnel
- Emergency escapes
- Steering flat
- Workshop
- Ventilation
- Engine control room.

4.1.3. Engine Room Machinery

State major items of machinery and their purpose (Main Engine, Tanks and Boilers)

Main Engine: Nomenclature and identifying

- Connecting Rod
- Cylinder Block
- Cylinder Head (4-stroke)
- Cylinder Liner
- Crank Pin
- Crank Shaft
- Cam Shaft
- Crosshead
- Crosshead Guide
- Fuel Injector
- Fuel Pump

- Inlet Valve & Exhaust Valve (4-stroke)
- Gudgeon Pin (4-Stroke)
- Governor
- Piston Rings
- Piston Skirt
- Push rod & Rocker arm (4-stroke)
- Piston
- Scavenge Ports (2-stroke)
- Stuffing Box
- Turbocharger

Tanks - Nomenclature and identifying.

- Fuel oil tank
- Sludge drain tank
- Lube oil drain tank
- Lube oil renovating tank
- Scavenger drain tank
- Stuffing oil drain tank.
- Piston cooling water tank.
- Bilge holding tank.
- Main engine crank case lube oil tank
- Hot well / cascade tank
- Diesel oil settling tank
- Diesel oil service tank
- Heavy oil settling tank
- Heavy oil service tank
- Mixing column
- Cylinder lube oil storage tank
- Jacket cooling water expansion tank
- Cofferdam and drain tanks

4.1.4. Auxiliary Machinery - Nomenclature and identifying

- Main air compressor
- Auxiliary / topping air compressor
- Emergency air compressor.
- Control air compressor
- Dehumidifier
- Fresh water generator
- Auxiliary air blower for main engine.
- Auxiliary generators / alternators.
- Exhaust boiler
- Incinerator
- Sewage plant
- Fresh water hydrophore
- Sanitary hydrophore
- Engine room overhead crane
- Auxiliary steam condenser

4.1.5. Terms and Symbols used in the engine room

- Identify different signs and symbols commonly found in the engine room
- Danger,
- No smoking,
- Emergency escape,
- Electrical safety,
- No entry.
- Welding safety
- Lathe safety

Any other related nomenclature and symbols may be additionally used.

4.1.6. Engine Room watch keeping procedures

Watchkeeping Schedule

- The term "watch" is used to mean either a group of personnel composing the watch or a period of responsibility for an engineer rating during which his/her physical presence in the machinery space may or may not be required.

- The system of watches adopted on board ships is usually a four hour on and eight hours off watch. On Offshore Support Vessels, a 6-hour cycle is normally adopted at all times. In port the system of 6 hour per watch cycle may be adopted.

Watch keeping Responsibility

- The Engineer Rating along with the EOW who is in charge of the Watch (EOW) shall be responsible for the inspection, operation and testing as required, of all machinery and equipment under his responsibility.

- EOW forming part of the engine room watch

- Under the EOW's general direction; engine room ratings shall be required to assist in the safe and efficient operation of the propulsion machinery and the auxiliary equipment.

- Watchkeeping tasks for Ratings – A Summary

- At the commencement of the engineering watch, check the current operational parameters and condition of all machinery. Report to the EOW any machinery not functioning properly, expected to malfunction or requiring special service.

- When the machinery spaces are in the manned condition, the engineer rating in charge of the watch shall at all times be readily capable of operating the propulsion equipment in response to needs for changes in direction or speed. When the machinery spaces are in the periodic unmanned condition, the designated duty engineer rating in charge of the watch shall be immediately available and on call to attend the machinery spaces.

- All bridge orders shall be promptly executed. The EOW shall ensure that the main propulsion unit controls, when in the manual mode of operation, are continuously attended under standby or manoeuvring conditions. Changes in direction or speed of the main propulsion unit shall be recorded. The engine rating is to assist the EOW in this duty.

- The Chief Engineer Rating shall ensure that the EOW is informed of all preventive maintenance, damage control, or repair operations to be performed during the watch. The EOW shall be responsible for the isolation, by passing and adjustment of all machinery under his/her responsibility that is to be worked on, and shall record all work carried out. The Engine rating is to assist the EOW in this duty.

- Before going off duty, the engineer rating in charge of the watch shall ensure that all events related to the main and auxiliary machinery are suitably recorded. The Engine rating is to assist the EOW in this duty.

Watch keeping Routines

- At all times, Ratings should be familiar with watch keeping routines and be of assistance to the EOW in these routines.
- Obtaining their work schedule and orders from the EOW
- Undertaking tasks and working alongside the other engine crew as per instructions received from EOW
- Assisting the EOW with the watch keeping duties
- Checking and reporting engine room machinery parameters
- Maintaining the cleanliness of main engine and auxiliaries and engine-room as a whole
- Checking, stowage and security of the engine-room stores
- Respond to engine room alarms
- Duties associated with taking over and accepting a watch.
- Routine duties undertaken during a watch.
- Maintenance of the machinery space log book and the significance of readings taken.
- Duties associated with handing over a watch.

Taking over the Watch

- The relieving EOW should be satisfied that the members of the watch are fully capable performing their duties effectively.
- The relieving rating should not take over the watch until the engine room log has been examined and checked that it is in accordance with EOW's own observations.
- At the beginning of the watch the current operational parameters and the condition of all machinery should be verified and also the log readings should correspond with those observed.
- The levels of tanks containing fuel, water, slops, ballast, etc., should be noted and also the level of the various bilges. The operating mode of equipment and available standby equipment should also be noted.
- The EOW should note if there are any special orders or instructions relating to the operation of the main machinery or auxiliaries and determine what work is in progress and any hazards or limitations this presents.
- EOW should instruct the watch keeping rating accordingly on duties to be performed while on watch.

- Every Rating who is nominated as the assistant to the EOW on seagoing ships and having specific duties and responsibilities relating to these duties in connection with the safe operation and servicing of machinery should meet the minimum requirements to the satisfaction of the Administration and STCW Convention.

Every such Rating should possess:

Knowledge of the main parts and function of propulsion and auxiliary machinery

- Knowledge of engine-room watchkeeping procedures and the ability to carry out a watch routine.
- Knowledge of use of hand tools and portable power tools
- Ability to read indicating instruments such as pressure gauges and level gauges related to watchkeeping duties and understand the significance of the readings
- Knowledge of the function, basic operation of the piping and pumping systems including their colour coding.
- Demonstration of the cleaning of filters and strainers
- Knowledge of safe working practices related to engine-room operations
- Knowledge of technical terms used in the machinery spaces and names of all relevant machinery details and equipment.
- Every such rating forming part of an engine-room watch should be familiar with watch keeping duties in the machinery spaces. In particular, with respect to duties on any ship, the rating should have:
- Knowledge of the use of appropriate internal communication systems
- Knowledge of escape routes from machinery spaces
- Knowledge of engine-room alarm systems and ability to distinguish between the various alarms, with special reference to fire extinguishing gas alarms
- Familiarity with the location and use of firefighting equipment in the machinery spaces
- Familiarity with environmental protection equipment
- Ability to understand and make himself understood by the engineer officer in charge of the watch
- Watch keeping Routines
- At all times, Ratings should be familiar with watch keeping routines and be of assistance to the EOW in these routines.
- Duties associated with handing over and taking over a watch
- Routine duties undertaken during a watch
- Taking soundings, reading of parameters of various gauges and reporting to the officer of the watch (EOW)
- Checking for any leakages, noises and smells when taking round in the engine room and reporting
- Handing and Taking over the Watch
- The instructor should explain to the trainee the duties of engine room ratings during handing and taking over the watch. The instructor may refer to company’s ISM manuals as examples of such procedures.
- The followings are some of the suggested key items:
- The rating should not take over the watch until he/ she has observed the engine-room space.
- At the beginning of the watch the current operational parameters and the condition of all machinery should be noted.

- The rating should note if there are any special orders or instructions relating to the Operation of the main machinery or auxiliaries.
- The rating should be aware of the work in progress in the engine room and any hazards or limitations.
- The records of levels of tanks containing fuel, water, slops, ballast, etc., and the levels of various bilges should be noted during handover. The operating mode of equipment and available standby equipment should also be noted.
- The rating should inform the EOW if he has reason to believe that the relieving rating is not capable of carrying out his/her duties effectively.

While on Watch

- The instructor should explain to the trainee the duties of engine room ratings during the watch.
- The followings are some of the suggested key items:
- At appropriate intervals rounds should be made of the engine room and steering gear spaces. During these tours of inspection bilge levels should be noted, piping and systems observed for leaks, and local indicating instruments readings can be observed and recorded.
- Certain watch keeping duties will be necessary for the continuous operation of equipment or plant, e.g. the transferring of fuel. In addition to these regular tasks other repair or maintenance tasks may also be need to be carried out as per instructions of EOW.
- Reading of soundings and other parameters of main/auxiliary machinery
- During the watch, record should be taken of the various parameters of main and auxiliary equipment.
- Auxiliary boiler parameters are also recorded.

Communication with EOW

- The rating should notify the EOW immediately in the event of any serious occurrence or a situation where he is unsure of the action to take. Examples might be, if any machinery suffers severe damage, or a malfunction occurs which may lead to serious damage.
- UMS Operation
- The machinery space is usually unattended during off-duty hours and on weekends.
- In case the rating has to enter the engine room during UMS operation, the rating should inform the bridge prior going to the engine room and activates the dead man’s prior entering the engine room. Likewise, he must inform the bridge after coming out and de-activate the alarm accordingly.
- Further Guide to Watchkeeping
- The condition checking of the installation is exercised during rounds in the engine-room. During these rounds, the watchkeeper must use four of the five human senses.
- The sense of hearing is used to ascertain whether abnormal noise occurs during engine operation. The sense of touch is used to feel accessible bearings and pipes, etc., to determine whether the temperature of the relevant engine part is normal. By using the sense of smell.
- Is often possible to detect leakages, overheating of bearings, excessive loads on electrical equipment and cables etc. The sense of sight enables leakages to be noticed, enables observations to be made concerning the satisfactory working of cylinder lubricators, the reading of thermometers and manometers, and to ascertain that the vapour from the

crankshaft casing breather pipe is normal (abnormal vapour will arise in the event of hot running of bearings or pistons, or if the lubricating oil contains water).

Log Books

- During the watch a log or record will be taken of the various parameters of main and auxiliary equipment. This may be a manual operation or provided automatically on modern vessels by a data logger.
- Fuel consumption figures are used to determine the efficiency of operation, in addition to providing a check on the available bunker quantities.
- Lubricating oil tank levels and consumptions to some extent indicate engine oil consumption. The sump level is recorded and checked that it does not rise or fall, but a gradual fall is acceptable as the engine uses some oil during operation. If the sump level were to rise this would indicate water leakage into the oil and an investigation into the cause must be made.
- The engine exhaust temperatures should all read about the same to indicate an equal power production from each cylinder. The various temperature and pressure values for the cooling water and lubricating oil should be at, or near to, the manufacturer's designed values for the particular speed or fuel lever settings. Any high outlet temperature for cooling water would indicate a lack of supply to that point.
- Various parameters for the main engine turbochargers are also logged. Various miscellaneous level and temperature readings are taken of heavy oil tanks, both settling and service, stern tube bearing temperature, sea water temperature, etc.
- The operating diesel generators will have their exhaust temperatures, cooling water and lubricating oil temperatures and pressures logged in much the same way as for the main engine. Of particular importance will be the log of running hours since this will be the basis for overhauling the machinery.
- Other auxiliary machinery and equipment, such as heat exchangers, fresh water generator (evaporator), boiler, air conditioning plant and refrigeration plant will also have appropriate readings taken.
- There will usually be summaries or daily account tables for heavy oil, diesel oil, lubricating oil and fresh water, which will be compiled at noon. Provision is also made for remarks or important events to be noted in the log for each watch.
- The completed log is used to compile a summary sheet or abstract of information which is returned to the company head office for record purposes.
- Auxiliary boiler parameters are also logged.

4.1 Bench work, turning and fitting.

4.2.1 Basic fitting:

- Demonstrate procedure for dismantling and assembling pipes and valves using hand tools.
- State procedures for assembling the same.
- State safety precautions to be taken before dismantling, while working and at the time of assembly.

Fasteners

- Identify and name each types of fasteners list (bolts, studs, nuts, common screw, common lock nuts and devices, and common types of washers)

- Demonstrate proper methods of using fasteners and features.
- Demonstrate ways and means of releasing rusted nuts, opening rounded nuts, removing broken studs, releasing nuts seized on a stud, securing studs back on a body of valves and similar locations.
- State the tools that can be used to repair damaged internal or external threads

Safe working procedures, Tools & instruments

4.2.2 Hand Tools, Measuring instruments

- Identify and name each of hand tools listed below: (on a given diagram, and actual tool). Hammers, chisels, files, hack saw, screw drives, spanners, pliers, adjustable spanners, box spanners, wrench, crow bars, shears, type punches, center punch, hole punch, and marking tools.
- Use each of the tools listed below properly and safely – Hammers, chisels, files, hack saw, screw drives, spanners, pliers, adjustable spanners, box spanners, wrench, crow bars, shears, type punches, center punch, hole punch, and marking tools.
- Identify and name each of the measuring instruments (steel scales, inside and outside calipers, thread gauge, feeler gauge, Vernier caliper, inside and outside micrometer)
- Use the following measuring instruments properly on given tasks. (steel scales, inside and outside calipers, Vernier caliper, inside and outside micrometer)
- On board ship various categories of hand tools and machine tools are being used.
- There are cutting and smoothing tools which includes hack saws, chisels and files.
- There are driving tools like hammers and screwdrivers.
- There are measuring and marking out tools like Vernier calipers, micrometers, steel rules, tapes and marking tools.
- There are gripping and twisting tools like pliers and wrenches or spanners.
- There are holding tools like vises and clamps.
- There are tools like drills and grinders which could be portable hand-held or as machine tools which are secured to a floor stand.

Hand tools

- The instructor should guide the trainee on the common causes of accidents due to Hand Tools, which are:
- Wrong tool for job
- Wrong size of tool
- Poorly maintained tool
- Defect in tool
- Fall of tool-not stored properly
- Wrong method of handling / carrying
- Unauthorized modification of tools
- Important Preventive Measures:
- Use the right tools.
- Use a tool in good condition.
- Use the tool in the right way.
- Keep tools in a safe place.
- Use appropriate P. P. E.
- Carry tools in tool box / bag.

SAFE PRACTICES FOR COMMONLY USED HAND TOOLS:

- Screw Driver:
- Never use a screw driver as a chisel, punch or wedge.
- Never pry with a screw driver.
- Do not carry the screw drivers in pockets.
- Never hold a job in your hand.
- Screw driver tip should match with the design and size of slot.
- A damaged tip should be dressed.
- For electrical work, use screw drivers with insulated handled.

Hammer:

- Use a soft-faced hammer to strike hardened steel surface.
- Use a heavy hammer for heavy jobs.
- Replace the loose wedge with a good steel or wooden one-never use a nail.
- Replace the hammer if the face is damaged or has grown brittle.
- If the handled is greasy, clean it before using the hammer.
- Always replace cracked, splintered or broken handles, never repair them.
- Keep your eyes on the spot you are hitting.
- Use pliers to hold the work. Keep your hand out of the way.

Chisel: (Steel Wedges, Punches and similar tools)

- Do not use mushroomed chisel.
- Dress the head whenever signs of cracking or spreading appear.
- A chisel only large enough for one job should be selected so that the blade is used rather than only one point or corner.
- Keep the cutting edge sharp and ground at the right angle. A sharp edge takes a good bite and does not slip easily. With a dull-edged chisel you have to strike harder and there is more chance that the hammer may miss and hit your hand.

Spanner / Wrench:

- Use wrench of right size.
- Do not use worn wrench.
- Always get the jaws squarely on the nut.
- To prevent adjustable wrench from slipping, set the jaw up tight. Pull towards the movable jaw.
- Use a pipe wrench to remove worn nut.
- Always hold something solid with one hand and keep the wrench under control.
- Never slip a pipe over a wrench to get more leverage. Get a bigger wrench.
- Never use a wrench around moving machinery.

Knife:

- Use sharp knife – occasionally, touch it up on a whetstone.
- Cut away from yourself – never towards any part of your body.
- When a job is over put the knife in sheath.
- If you are setting the knife down for only a moment, put it where it won't be in the way and don't leave it where it might fall.
- Do not use a file without a handle.

- Do not use files as punches or drifts.
- It is dangerous to pry with a file. Files are brittle and break easily. When they do, pieces fly around.
- When a file gets clogged with metal it may slip. Keep it sharp-tap it on edge once in a while to knock off the filings. When that does not help, clean it with a file card.
- Files must not be twisted in slotted work.

Pliers:

- Do not use pliers as a substitute for wrenches.
- Be certain that pliers used for electrical work are insulated.
- USE NON-SPARKING TOOLS IN FIRE PRONE AREAS

Safety Precautions

- Put on protective apparatus such as coverall, safety goggles, gloves and safety shoes.
- Do not use defective tools. Ensure all file handles are in good condition.
- Ensure work piece is tightly secured on the vice when sawing and filing.

4.3.1 Lifting devices and equipment, Basic fitting, / Fasteners

- Identify lifting devices and associated components (Slings, pulleys, eye bolts, shackles, pulleys, chain blocks, and engine room crane if available).
- State checks to be made before using each of the (Slings, pulleys, eye bolts, shackles, pulleys, chain blocks, and engine room crane if available).
- State hazards involved in moving and lifting heavy objects using slings, pulleys, eye bolts, shackles, pulleys, chain blocks, (engine room crane if available).
- Move and shift equipment manually
- Move and shift machinery item using lifting devices such as slings, pulleys, eye bolts, shackles, pulleys, chain blocks, (engine room crane if available).

4.3.2 Safety precautions while working in the engine room

The instructor should explain to the trainees that there are various hazards on board a ship which could bring harm to the trainees or their colleagues. The hazards could be:

- Mechanical - hit or be hit by a moving object causing impact injury
- Electrical - come in contact with live electrical circuit causing electrocution
- Thermal - contact with extreme hot or cold objects can cause hot or cold burns
- Chemical - contact with corrosive, poisonous substances can cause burns and allergies
- Inhalation - inhalation of asphyxiating and toxic gases could lead to sudden loss of consciousness and death
- Noise and vibration
- The appropriate Personal Protective equipment (PPE) when worn correctly provides a barrier between the hazard and the body, preventing serious injuries. Code of safe working practices (B2) for merchant seafarers may be referred to.
- The trainee should be made aware of that for certain areas of work, working permit may be needed prior to commencement of the work.
- Before any repair or maintenance work is commenced, care should be taken to ensure that all measures and precautions necessary for the safety of those concerned have been taken.

- No maintenance work or repair which might affect the supply of water to the fire main or sprinkler system should be started without the prior permission of the Master and Chief Engineer.
- No alarm system should be isolated without the permission of the Chief Engineer.
- Before machinery is serviced or repaired, measures should be taken to prevent turning or inadvertent starting as may occur with automatic or remote control systems.
- Electrically-operated machinery should be isolated from the power supply.
- Steam-operated machinery should have both steam and exhaust valves securely closed and, where possible, locked off.
- In all cases, warning notices should be posted at or near the controls giving
- Warning that the machinery concerned is not to be used.
- When valves or filter covers have to be removed or similar operations have to be performed on pressurized systems that part of the system should be isolated by closing the appropriate valves. Drain cocks should be opened to ensure that pressure is off the system.
- When joints of pipes, fittings, etc. are being broken, the fastenings should not be completely removed until the joint has been broken and it has been established that no pressure remains within.
- Before a section of the steam pipe system is opened to the steam supply, all drains should be opened. Steam should be admitted very slowly and the drains kept open until all the water has been expelled.
- The officer in charge should give careful consideration to the hazards involved before allowing maintenance or repairs to, or immediately adjacent to, moving machinery. This should be permitted only in circumstances where no danger exists or where it is impracticable for the machinery to be stopped.
- The officer in charge should consider whether it is necessary in the interests of safety for a second person to be in close attendance whilst the work is being carried out.
- Means of access to fire-fighting equipment, emergency escape routes and watertight doors should never be obstructed.
- When guards or other safety devices have been removed from machinery to facilitate the overhaul, they should be replaced immediately the work is completed and before the machinery or equipment is tested.
- An approved safety lamp should always be used for illuminating spaces where oil or oil vapor is present. Vapor should be dispersed by ventilation before any work is commenced.
- A marine spike, steel rod, or other suitable device should be used to align holes in machinery being reassembled or mounted; fingers should never be used.
- On board ship various categories of hand tools and machine tools are being used.
- There are cutting and smoothing tools which includes hack saws, chisels and files.
- There are driving tools like hammers and screwdrivers.
- There are measuring and marking out tools like Vernier calipers, micrometers, steel rules, tapes and marking tools.
- There are gripping and twisting tools like pliers and wrenches or spanners.
- There are holding tools like vises and clamps.
- There are tools like drills and grinders which could be portable hand-held or as machine tools which are secured to a floor stand.

4.3.4 Safety precautions during bad weather

- Understand whether Engine room is on UMS mode, man the engine room and make sure sufficient man power is available.

- Explain monitoring all the parameters of the main propulsion plant and auxiliary power plant machineries.
- Explain that fter getting rough weather warning, all the spares in the engine room are to be stowed and lashed properly.
- Explain that in bad weather, propeller will come in and out of water and will fluctuate the main engine load. Hence rpm is to be monitored.
- Explain to make sure for correct sump level of all the machineries as during rough sea ship will roll, resulting in false level alarm which can even trip the running machine and lead to dangerous situation in bad weather.
- Explain regarding levels of all the important tanks is to be maintained so that pump inlet should not loose suction at any time.
- Ensure that Water tight doors in the machinery spaces to be closed.
- Ensure Sky light and other opening are to be closed.

4.3.5 Safety precautions during hot work

- Never use oil or grease in any point of assembly of gas.
- No Inflammable materials should be kept near the cutting or welding area.
- Always wear fire resistant clothes, gloves (leather), apron, and goggles and filter lens during welding and cutting.
- Rectify leakage noticed immediately, as even a small leakage can cause serious accidents.
- Always keep the fire extinguisher nearby and ready.
- Close all valves and regulators after use.

4.3.6 Safety precautions while working on electrical equipments

- Describe the isolation procedures and precautions to be taken before maintenance or repairs on an electrical equipment or system can be started:
- operation of stand by equipment
- power off / removal of fuses
- locking of main breakers (main and local switch boards)
- placing of sign boards/tag out
- checking voltage / apply earthing
- permit to work
- selection of tools/PPE

Safety precautions before commencing work or repair

- States /demonstrates methods
- Describes / demonstrates isolation procedures
- Describes / demonstrates emergency procedures
- Describes / demonstrates different voltages on board

4.3.7 Safety precautions before entering enclosed spaces

The following are the points that need explained to the trainees for them to be followed before entering an enclosed space:

- Risk assessment to be carried out by a competent officer as enclosed or confined space entry is deficient in oxygen, making it a potential life hazard.
- Potential hazards are to be identified such as presence of toxic gases.
- Opening and securing has to be done and precaution should be taken to check if the opening of enclosed space is pressurized or not.
- All fire hazard possibilities should be minimized if hot work is to be carried out. This can be done by emptying the fuel tank or chemical tank nearby the hot work place.
- The confined space has to be well ventilated before entering.
- The space has to be checked for oxygen content and other gas content with the help of oxygen analyzer and gas detector.
- The oxygen content should read 20% by volume. Percentage less than that is not acceptable and more time for ventilation should be given in such circumstances.
- Enough lighting and illumination should be present in the enclosed space before entering.
- A proper permit to work has to be filled out and checklist to be checked so as to prevent any accident which can endanger life.
- Permit to work is to be valid only for a certain time period. If time period expires then again new permit is to be issued and checklist is to be filled out.
- Permit to work has to be checked and permitted by the Master of the ship in order to work in confined space.
- Proper signs and Men at work sign boards should be provided at required places so that person should not start any equipment, machinery or any operation in the confined space endangering life of the people working.
- Duty officer has to be informed before entering the enclosed space.
- The checklist has to be signed by the person involved in entry and also by a competent officer.
- One person always has to be kept standby to communicate with the person inside the space.
- The person may also carry a life line with him inside.
- The person should carry oxygen analyzer with him inside the enclosed space and it should be on all the time to monitor the oxygen content. As soon as level drops, the analyzer should sound alarm and the space should be evacuated quickly without any delay.
- No source of ignition has to be taken inside unless the Master or competent officer is satisfied.
- The number of persons entering should be constrained to the adequate number of persons who are actually needed inside for work.
- The rescue and resuscitation equipment are to be present outside the confined space. Rescue equipment includes breathing air apparatus and spare charge bottles.
- Means of hoisting an incapacitated person should be available.
- After finishing the work and when the person is out of the enclosed space, the after work checklist has to be filled.
- The permit to work has to be closed after this

4.3.8 Safety precautions during dry dock

The following are the points that need explained to the trainees for them to be followed before vessel entering a dry dock.

- Firefighting equipment ready at all times.
- Fire detectors and fire alarm in good working condition.

- CO2 total flooding system door is locked to prevent accidental actuation.
- Safety gear worn while working- safety shoes, helmet, overalls, safety goggles, ear mufflers, and gloves.
- Escape routes should be clearly marked.
- Proper working permits obtained before carrying any work on board; e.g. hot work permit, enclosed space entry permit.
- All lifting gears checked to be in good working condition.
- Co-ordination of work, so no chemical cleaning and hot work around boiler area is done at the same time.
- No transfer of oil carried out in dry dock.
- No boiler blow downs; in emergency, necessary notice given.
- Acetylene and oxygen bottles are properly stored and secured.
- Ship properly grounded to shore earth.
- Fire line is always ready with 2 hydrants open if no hull work is carried out.
- Safety meetings should be carried out every morning before stating the work in dry dock.

4.3.9 Cleaning of engine room bilges, disposal of engine room waste.

- Cleaning of bilge wells
- Ability to correctly measure and report tank levels
- Demonstrates to measure and report bilge and holding tank levels during and on completion of the operation correctly
- Understand the importance of keeping the engine room floor plates clean and free of oil.
- Know the importance of segregation of garbage and the colour coding used for garbage segregation.
- Know the procedure to burn garbage in an incinerator.
- Know the materials that are prohibited in an incinerator.
- Know the dangers associated with sewage treatment plant cleaning
- Understand the importance of segregation of oil and water in the machinery space.
- Know the precautions in operation of an oily water separator

4.3.10 Bilge pumping system

- Describes the function of the bilge system
- Explains with the help of a drawing the piping diagrams of the bilge systems
- Describes the operation of the pumps used in a bilge system
- Demonstrates the safe operating procedure for operating the bilge system:
- Operate the valves and pumps in order to empty a bilge well
- Actions to be taken in case of an incident

Ballasting & de-ballasting system, bunkering procedures

- Describe Ballasting & De ballasting system & Bunkering procedures
- Demonstrates the safe operating procedure for operating the ballast system:
- Operate the valves and pumps in order to transfer ballast water
- Correctly measure and report tank levels during and on completion of the operation
- Actions to be taken in case of an incident

Maintenance work & preservation

- Assist in maintenance tasks on auxiliary diesel engines, heat exchangers, pumps

- Clean diesel engine components such as pistons, piston rings, bearings,
- Clean components using diesel oil, chemicals.

Protection and preservation:

- Use chipping hammers, wire brushes, and power tools in removing rust.
- Prepare surface for painting – cleaning and degreasing.
- Paint surfaces using paint brushes, roller
- Identify components and function of air spray machine
- Explain advantages of using air spray machines
- State risks involved in using air spray machines .

4.4 Auxiliary Equipment & maintenance work

4.4.1. Valves

- Identifies the various types of valves for shipboard application
- Identify common types of valves and cocks used on board (globe, sluice or gate, butterfly, spring loaded, non-return globe, float valve, taper cock, and ball cocks.
- Identify major components of each type of valve and cock.
- State procedures for opening and closing of valves for operation (globe valves, gate valve, butterfly valve, using a wheel spanner)
- State function of drain valves and drain cocks for air bottles, oil fuel tanks, expansion
- Tanks and level gauges.
- Describes the safe operating procedures of the different type of valves

4.4.2. Pumps and Pumping Systems including ballasting & Deballasting

- Demonstrates the safe operating procedure for operating the ballast system:
- Lists the types of pumps found on board ships based on:
- Operating principle / application.
- Identify common types of pumps in the Engine Room (centrifugal, reciprocating, gear, screw pump)
- State the pumps that come under the category of ‘positive displacement pump’ and their peculiarity.
- State precautions necessary before starting any pump
- List major pumping systems in the engine room (Bilge, ballast, deck wash and fire supply, domestic fresh water, domestic sea water, expansion tanks, hot wells, compressed air system)
- State the purpose of each of the pumping system (Bilge, ballast, deck wash and fire supply, domestic fresh water, domestic sea water, expansion tanks, hot wells, compressed air system)
- State observations to be made on operating pump and air compressor

4.4.3. Joints and gland packing

- Identify types of joints used for pipe line and equipment having water, oil, air, steam, exhaust gases, and hot water.Identify type of packing material used for packing glands of valves or pumps for sea water, steam, and oil.
- Cut rubber or of stiff material suited for round or square flanges.

- Demonstrate procedures for cutting packing and for packing a gland.
- State precautions to be taken before commencing repair work on a pipeline or components in situ.
- Identify soft metal joints and 'O' rings and state care to be taken on these during maintenance
- Carry out temporary repair to a leaky pipe using clamps or jubilee clip.

4.4.4. Filters

- Identifying name oil filters, and air filters used on board.
- Identifies parts of a bucket type filter and a duplex type filter
- States hazards involved in cleaning filters on a running machinery.
- Know the PPE to be worn while cleaning filters.
- Understand the importance of blowing cleaning air thru the filter opposite to the direction of medium flow.
- Lists precautions to be taken before opening a filter for cleaning, on a stand by machine.
- States checks to be made on a filter during cleaning and re-assembly.
- State precautions to be taken while working on a hot filter.

4.4.5. Centrifugal separators

- Identify and state purpose of a centrifugal separator
- Assist in opening up purifiers and cleaning disc stack

4.4.6. Other Auxiliaries

- State functions of other auxiliaries and services such as sewage system, incinerators, refrigeration and air conditioning,

4.4.7. Boiler and Steam System & watch keeping duties

- State uses of steam on board.
- State major mountings on the water and steam side (Main steam stop valve, gauge glasses, safety valves, feed valve, blow down valve, air vent, pressure gauge connection)
- State basic operation of boiler (fuel supply, air supply, feed water supply, water level regulators, fuel control and cut outs)
- State observations to be made on an operating boiler
- State risks involved in operating an oil fired boiler
- State the meaning of 'flash back', 'over pressure', 'low water level', 'high water level'
- State procedures for keeping watch
- State importance of water level in a boiler Identify:- and list down the name of Component:
- Explain the following :-
  - Working pressure
  - Test pressure
  - Name the Safety cut out
  - Testing boiler Water level Gauge
  - Give a write up on working principal

4.4.8. Propeller & shafting

- State the use of propeller & shafting

4.4.9. Preservation of equipment in good condition

- Use chipping hammers, wire brushes, and power tools in removing rust.
- Prepare surface for painting, cleaning and degreasing.
- Paint surfaces using paint brushes, roller
- Identify components and function of air spray machine
- Explains advantages of using air spray machines
- States risks involved in using air spray machines

Identify components of diesel engines listed below:

4.4.10. Generator Engines

- Identify and state function of major components of an auxiliary (generator) diesel engine
- State important systems needed for operation of an auxiliary diesel engine (Lubrication, fuel, cooling water, starting, scavenge air and exhaust, safety system, governor)
- List safety devices on an auxiliary diesel engine
- Describe preparation needed for starting an auxiliary diesel engine
- State instruments fitted on an auxiliary diesel engine for monitoring its operating parameters.
- State checks to be made on an operating auxiliary engine
- States the lay-out and function of the diesel generator plant:
  - number of generator sets
  - combination with shaft generators
  - normal operational set-up for different conditions:
  - at sea
  - in port
  - during maneuvering
  - during bad weather
  - during loading and discharge operation
  - States pressure, levels and temperature ranges under normal operating conditions
  - Describes the preparation of the auxiliary diesel engines for starting:
  - priming
  - slow turning
  - visual check for leakages etc
  - check pressures, temperatures etc after starting
  - Describes common malfunctions and understand threshold limits of various systems

Basic knowledge of the function and operation of auxiliary machinery

- Describes the basic function and operation of the auxiliary machinery in order to monitor their operational condition:
- compressors
- purifiers
- heat exchangers
- pumps
- fresh water generators
- cold store and air conditioning units

- filters
- boilers
- Describes common malfunctions and understand threshold limits of various systems

4.4.11. Main Engines

- Identify major components of Main Engine (Turning gear, Cylinder head, exhaust valves, indicator valve, fuel injectors, fuel pump, piston, piston rod, connecting rod, cross head and guide, main bearing, cam shaft, crank shaft, crank case, crankcase relief valve.)
- State important systems necessary for operation of a Main Engine (Lubrication, fuel, cooling water, starting, air charging and exhaust, safety system)
- Describes the operating principles of two-stroke and four-stroke diesel engines
- Describes the functions of the major parts of two-stroke and four-stroke diesel engines
- Explains how to monitor the safe operation of the propulsion engine according to the parameters specified by the engine manufacturer and/or standing orders
- Describes common malfunctions and understand threshold limits of various systems
- Explains using diagrams the operation of the propulsion machinery piping systems
  - States pressure, levels and temperature ranges under normal operating conditions for the systems associated to the propulsion machinery
  - Describes the preparation of the main propulsion machinery for starting:
  - pre-heating
  - priming
  - slow turning
  - visual check on leakages etc
  - levels of expansion tanks
  - level of sump tanks
  - engine telegraph
  - stand by engine
  - steering gear etc
  - Describes common malfunctions and understand threshold limits of various systems

4.6 Compressed air for auxiliary purposes

- State different uses of compressed air for auxiliary purposes. (cleaning components and portable machines)
- State risks involved in working with compressed air for auxiliary purposes.
- Demonstrates use of compressed in cleaning filters and other components
- State the arrangement provided for draining the water from the air bottle
- Identify and list down the name of various Mountings
- Explain the following:
  - Safety valves
  - Bursting disc
  - Regulatory requirements for a Main Air Compressor safety device.
  - Importance of keeping the drains opens prior to starting the compressor.
  - What are the safety devices fitted on MAC and how they are tested?
  - Explain the lub oil circuit and cooling water circuit.
  - What is intercooler/after coolers and explain the principle.
  - What are the checks to be carried out during crankcase inspection of MAC.
  - What type of valves are fitted in different stages of MAC.
  - Procedure for overhauling and testing compressor valves.

4.7 Machines: Grinder, Drill, Lathe

- Identify and name major parts of a pedestal drill machine, and pedestal or a bench grinder:
- Drill holes using a fixed and portable drill machine
- Use fixed grinding machine for grinding plates, chisels, and scraper hand tools.
- Use hand grinder for grinding plates or parts.
- Use buffing or brush attachments for hand grinder.
- Lathe machine: Identify parts and common tools,
- Explain common tasks that can be performed on a lathe
- Explain risks involved while working with power tools : Drill, Grinder and Lathe
- Carry out basic turning and facing operation on lathe.
- Eye protection is essential. Always wear safety glasses when working or cleaning tools.
- Keep your hands away from sharp tools. Make sure that nothing that you do will cause you to be cut.
- Before you leave the shop each day all tools must be returned to the toolbox, the machine cleaned and wiped down and the floor swept. Leave 10-15 minutes for cleanup

Notes to the instructor: - demonstrate the different machine part and explain its various uses. Explain how to carry out the work with the types of cutting tool using safe working practices.

The instructor must advice regarding the DO'S

- Wear P. P.E. (helmet , safety shoes ,boiler suit , gloves)
- The floor must be kept clean and free from oil scraps.
- Make sure tool handles are properly secured to the tool before using them.
- Always wear goggles while filling and chipping operations
- Use proper tool for proper purpose for which it is designed
- Remove cutting chips with a brush, do not use fingers.
- Carryout risk assessment prior starting the assignment

The instructor must advice regarding the DON'T S

- Do not wear any ornament such as watches, bracelets.
- Do not use tools for a purpose other than for which it is designed.
- Do not handle and store tools carelessly, which can damage the tool.
- Do not carry edged or pointed tool in your pocket.
- Do not use a tool, which is oily and greasy.
- Do not talk or divert attention of your colleague who is carrying out his task
- Do not operate the Power tools without the permission of the workshop instructor.

4.8 Basic welding and cutting: Arc welding, gas welding, gas cutting

About Gas cylinders:

- Don't roll GAS Cylinders during shifting. Always use trolley to carry cylinders.
- Always keep the empty and filled cylinders separately.
- Always keep the cylinders in upright position.
- Ensures that flashback arrester and safety disk are fitted on the acetylene.
- Don't remove the cylinder opening key from the cylinder while in use, as it will
- help in closing the valves quickly in case of any emergency.
- About rubber hose pipe:

- Use only recommended type of pipe for gas cutting and welding.
- Use black/blue colored pipe for oxygen and maroon/red for acetylene.
- Avoid damages to pipe due to rubbing against hard and sharp surface, edges
- Don't add broken hoses to make up the length.
- Below up the hose pipe to remove dirt and dust.
- Protect the regulator from water, oil etc.
- Never change the oxygen, acetylene regulators, as it may damage the threads.
- While igniting, place the torch in safe distance.
- While putting off the flame, shut the acetylene valve first and then oxygen to avoid back fire

Back Fire

- At certain time during flame ignition in a gas cutting/welding a small explosion of flame occurs at the torch tip. This may or may not go off.
- Gas pressure settling may be low
- Nozzle is over heated.
- When the nozzle touches the melting area.
- Due to leakage near the nozzle.

Flash Back

- Sometimes during the back fire the flame goes off and the burning acetylene gas travels back in the blow pipe towards the cylinder. Indications are there, that a sharp squeezing sound inside the blowpipe may be hard, heavy, black smoke and sparks comes out of the nozzle.

Arc Welding

- State the hazards involved in using and working with welding equipment – Arc Welding and Gas cutting/welding
- Identify components of arc welding machine used on board, personal protective equipment, tools and accessories used for welding.

4.9 Lubricants and lubrication

- State type of oils and greases used on board in ER and on Deck. (cylinder oil, crankcase oil, gear oil, hydraulic oil, general purpose grease, open grease, wire rope grease)
- States different methods of lubrication used on machinery and components
- Identify grease nipples, greasing and oiling equipment
- Demonstrates use of grease guns
- Use oil can for filling in oil in crankcase of a machine
- State precautions to be taken while working on or near an operating machinery.
- State risks involved if oil or grease falls on hot surfaces
- Describes the lay-out of:
  - Fuel oil transfer systems - Bunkering stations - Lubrication oil transfer system
- Explains with the use of a simple line diagram the fuel oil and lubrication oil transfer piping arrangements of a vessel
- Explains the procedures for bunkering and transferring fuel and lubricants with regards to:
  - preparation of operations
  - plugs for scuppers

- oil spill containment equipment and materials
- adaptors for hoses
- sounding tapes
- hand held radio's
- schedule of tanks to be loaded

- Procedures for connecting and disconnecting fuelling transfer hoses
  States / demonstrates / describes
- Explains the procedures for bunkering and transferring fuel and lubricants with regards to:
- Connecting and disconnecting transfer hoses and supporting equipment
- Procedures relating to incidents that may arise during fuelling or transferring operation
  States / demonstrates / describes
- Explains the procedures for bunkering and transferring fuel and lubricants with regards to:
- actions to be taken in case of an incident
- stop transfer immediately / inform bridge and duty engineer / contain spilled oil
- Securing from fuelling and transfer operations
- Explains the procedures for bunkering and transferring fuel and lubricants with regards to:
  States / demonstrates / describes
- Securing materials and equipment at completion of the operation
- Ability to correctly measure and report tank levels
- Explains the procedures for bunkering and transferring fuel and lubricants with regards to:
- Correctly measure and report tank levels during and on completion of the operation

4.10 Level measuring devices and techniques

- Identify and name different level measuring devices and equipment listed below:
- Dip sticks, sounding rods, sounding tapes, gauge glass and sight glass.
- Demonstrate use of dip sticks, sounding rods, sounding tapes, in sounding a level of liquid in a tank.
- Read level gauges to check oil and water levels in tanks
- State the type of fitting on a sounding pipe for a double bottom tank.
- State the hazard of leaving the gauge in a working condition if cocks, spring loaded valves have been gagged while testing a gauge

4.11 Lagging and insulation

- State purpose of lagging and insulation material on pipes and components in the engine room.
- State importance of maintaining lagging and insulating material, and prevention of contact with oil.
- State the common material used for lagging
- State precaution to be taken while handling a torn lagging.

4.12 Chemicals on board

- State chemicals used for different purposes on board: Air cooler and other coolers cleaners; Boiler water treatment, fuel oil treatment
- State precautions to be taken while using and handling chemicals on board

4.13 Steering Gear

4.13.1. Function of steering gear, check to be made while taking a round in the steering

gear compartment

- State function of a steering gear & its importance for trouble free operation & checks to be made while taking a round in the steering flat.

4.13.2. Bow thruster location & importance

- State functions of bow thruster, its location and importance

4.14 Storage tanks

4.14.1. Types of storage tanks in the engine room

- State types of storage tanks – wing tanks, double bottom tanks, tanks within the engine room such as lube oil storage, expansion tank, lub oil sump)
- State liquids stored in tanks: Fuel, lubricating oil, and fresh water.

4.14.2 Purpose & operation of quick closing valves

- State the purpose & operation of a 'quick closing valve'.
- Identify a quick closing valve.

4.14 Emergencies in the engine room

4.14.1. Various emergencies in the engine room

- State emergencies that can occur in the engine room
- Fire,
- Flooding,
- Black out,
- Oil spill,
- Injuries,
- Electric shocks,
- Burns.

4.14.2 Types of audio-visual alarms

State the difference between,

- General alarm
- Machinery failure alarm
- Co2 flooding alarm
- Foam release alarm
- Reefer room alarm
- Engineer call alarm

4.14.3 Action to be taken on hearing/seeing alarms

- State action to be taken on hearing each type of alarm
- State that all alarms in the ER are of Audio Visual Type

4.14.4 Emergency escape routes

- State the importance of emergency escape route
- Marking of emergency route and escape
- Equipment which need to be kept in the emergency escape area
- Use of EEBD

4.16 Fire extinguishing equipment in the engine room

4.16.1. Portable firefighting appliances in the engine room

- List fire extinguishing equipment found in the engine room (Portable extinguishers, non-portable extinguishers, fire hydrants, hoses and nozzles)
- State methods of detecting fire in the engine room (smoke type, heat type, flame type)
- State methods of raising alarm on finding a fire in the ER.

4.16.2. Fixed firefighting equipment – CO_2 / Foam, Water / Sprinkler, / Hyper Mist, Emergency Fire Pump

- State the function of fixed firefighting installation: CO2, foam, water sprinkler, hyper mist
- State the purpose and location of Emergency fire pump that supplies water in emergency

4.17Basic Marine Engineering at Support Level

4.17.1. Maintenance of Engine Room main & auxiliary machineries

- Describe engineering materials & Special Tools used for maintenance of Engine Room main and auxiliary Machineries.
- State Watch-keeping procedures on main and auxiliary Machineries

4.17.2. Watch keeping duties on main & auxiliary machineries including boilers

- Describe working of Diesel engine
- Describe working of Diesel engine

4.17.3. Working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant

- Describe working of Diesel engine, air compressor, evaporator, oily bilge separator, A/C & fridge plant.
- State Watch-keeping procedures on Diesel engine, air compressor, evaporator, oily bilge separator, A/C & fridge plant.

4.17.4. Remote operations & internal communications system

- Describe Remote operations & internal communications system.

Appendix 1 E

Electrical, electronic and control engineering at Support level

Specific Learning Objectives

Parts/Title	T Hrs	Practical/ Skill Hrs	Total Hrs	Wks
Part 5 Electrical, electronic and control engineering at Support level (A-III/5)	**5**	**30**	**35**	**0.83**

	Electrical, electronic and control engineering at Support level (A-III/5)	Theory Hrs	Practical Hrs
5.1	5.1.1. Safe use of electrical equipment 5.1.2. Hand tools for Electrical Maintenance 5.1.3. Electrical Components & Equipment 5.1.4. Electrical Safety	**5**	**30**

5.1.1 Safe use of electrical equipment

- Safe use and operation of electrical equipment, including
- In implementing the section of this course, the instructor should ensure that the Trainees have prior and adequate training and experience as ratings and have Demonstrated the ability to perform tasks as required of ratings.
- Safety precautions before commencing work or repair
- Isolation Procedures
- Emergency Procedures
- Different voltages on board
- Knowledge of electrical shock and precautions to be observed to prevent shock

5.1.2 Hand tools for Electrical Maintenance

- Identify basic tools and their safety aspects
- State precautions to be taken prior commencing work or repair of electrical equipment
- State isolation & emergency procedures
- State different voltages on board

5.1.3 Electrical Components & Equipment

- Electrical Equipment in ER (generators, motors, switch boards, lighting, switches, Starters, starter panels
- Identify electrical components - plugs, sockets, bulbs and tubes, cluster lights, and Portable lamps
- Carry out basic electrical maintenance: changing plugs, replacing bulbs and tubes, Rigging up cluster lights and portable lamps
- States importance of taking care of wires against chaffing

5.1.4 Electrical Safety

- Understand and follow safety instructions of electrical equipment and machinery.
- Recognizes and report electrical hazards and unsafe equipment.
- Understand safe voltages for hand-held equipment.
- Understand risks associated with high-voltage equipment and onboard work.

Appendix 1 F

Part 6 - Controlling the Operation of ship and Care of persons onboard

Specific Learning Objectives

Parts/Title	T Hrs	Practical Skill Hours	Total Hrs	Wks
Part 6 Controlling the Operation of Ship and care for persons on board at Support Level (A-II/5 & A-III/5)	**30**	**118**	**148**	**3.52**

		Theory	Practical
6.1	**Rope Work** **Knowledge of the following procedures and ability to** 6.1.1 Natural and synthetic Fiber ropes, wire ropes, cables and chains, including their construction, use, markings, maintenance and proper stowage 6.1.2 Use marlin spike seamanship skills, including the proper use of knots, splices and stoppers 6.1.3 Rig and unrig pilot ladders, hoists, rat-guards and gangways 6.1.4 Rig and unrig Bosun's chairs and staging 6.1.5 Take precautions and climb a mast 6.1.6 Blocks and Tackles	**6**	**60**
6.2	**Contribute to the safe operation of deck equipment and machinery** Knowledge of Deck equipment including 6.2.1 Function and uses of valves and pumps, hoists, cranes, booms, and related equipment 6.2.2 Function and uses winches, windlasses, capstans and related equipment 6.2.3 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists 6.2.4 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea, and in emergencies 6.2.5 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or elevators.	**6**	**12**
6.3	**Safe working practices and personal shipboard safety of Personal & Protection Equipment- COSWP** 6.3.1. Safe working practices (General) 6.3.2. Risk Assessment (Basic) 6.3.3. Permit to Work System /Work-Permits/ Emergencies 6.3.4. Safe Access to the Ship 6.3.5 Safe Working Practices during Berthing / Un berthing, and Anchoring 6.3.6 Safety Precautions, when working aloft	**12**	**30**

		Theory	Practical
	6.3.7 Safety Precautions, when working over side 6.3.8 Safety Precautions during working in enclosed spaces 6.3.9 Safety Precautions, during manual lifting of weights 6.3.10 Demonstrates working knowledge of electrical safety 6.3.11 Safety precautions when climbing fixed vertical ladders and Portable ladders 6.3.12 Safety precautions when rigging scaffolding and using it 6.3.13 Safety precautions when handling chemicals and strong detergents 6.3.14 Communicate with other persons on board on elementary safety matters (1.5 hours) understand safety Information symbols, signs and alarm signals 6.3.15 Shipping Organization (National) & documents for seafarers 6.3.16 International Organizations and Conventions 6.3.17 Duties of a Gangway Watch in Port (intro to ISPS Code)		
6.4	**Knowledge of flags and flag work** 6.4.1. Demonstrate knowledge and understanding of hoisting and i. dipping flags and the main single, National flag, ii. courtesy flag, company flag, independent pendants 6.4.2. Flag signals. A, 6.4.3. Flag signals .B, 6.4.4. Flag signals. G, 6.4.5. Flag signals. H, 6.4.6. Flag signals. O, 6.4.7. Flag signals .P, 6.4.8. Flag signals. Q	**3**	**4**
6.5	**Apply precautions and contribute to the prevention of pollution of the marine environment** 6.5.1 Sources of pollution at Sea from ship 6.5.2 Damage to the environment 6.5.3 Importance of prevention of pollution of the sea and means of preventing pollution; Basic knowledge of MARPOL 73/78 6.5.4 Proactive measures to protect the marine environment 6.5.5 Knowledge of the Use and operation of anti-pollution equipment. 6.5.6 Disposal of Garbage 6.5.7 Exchange of ballast water	**3**	**12**
	Total	**30**	**118**

6.1 Rope Work

6.1.1 Natural and synthetic Fiber ropes, wire ropes, cables and chains, including their construction, use, markings, maintenance and proper stowage

Trainee will be able to:

- List the kind of ropes used onboard the ship.
- Explain the construction and lay of the ropes.
- Explain the care and maintenance of the vegetable/ synthetic/ wire ropes.
- List the precautions necessary, when opening a new coil of rope or wire rope.

- Demonstrate his ability to make various knots, bends and hitches used onboard the ship and explain their uses.
- Demonstrate his ability to coil a rope.
- Demonstrate his ability to make various kinds of 'Whipping' on the ends of ropes and explain its uses.
- Identify ropes by their diameter, lay, strands, etc.
- Demonstrate his ability to do a short-splice, long-splice and eye-splice of ropes.
- Use of marlin spike, fid and mallet.
- Demonstrate ability to do an eye-splice on wire rope.
- Demonstrate ability to do an eye-splice on a polypropylene mooring hawser
- Building clips are used to make an eye or join two wire ropes in case splicing cannot be performed
- Use of building grips must not be used on lifting wires, mooring wires, plastic coated wire ropes
- Also building clips must not be used on wires subject to strong vibrations
- Building grips must be correctly fitted. The 'U' of the grip must be placed on the dead end of the rope. At least three grips must be applied, distance between the grips being approx. to rope diameters.
- Use of building grips must not be used on lifting wires, mooring wires, plastic coated wire ropes
- Also building clips must not be used on wires subject to strong vibrations
- Building grips must be correctly fitted. The 'U' of the grip must be placed on the dead end of the rope. At least three grips must be applied, distance between the grips being approx. to six times the rope diameters.

6.1.2 Use marlin spike seamanship skills, including the proper use of knots, splices and stoppers

- Demonstrates use of spike, fids and other hand tools for rope work.
- Demonstrates rigging works (knots and splicing) safely in the context of good seamanship
- Make a bend, hitch and a knot for temporarily joining two ropes /temporary joining a rope to a structure. Demonstrate tying of all essential knots and hitches
- Coiling / uncoiling of fibre and wire ropes
- Measuring diameter of ropes
- Splicing of fibre ropes
- Splicing of wire ropes
- Whipping
- Care and maintenance of rope in use
- Inspection of rope for defects and criteria for rejection and replacement

6.1.3 Rig and unrig pilot ladders, hoists, rat-guards and gangways

- Procedure of rigging/stowing gangways and accommodation ladders with regard to safety
- Securely rigging safety nets to prevent persons falling between ship and quay or onto the quay
- Rigging and attending rat guards
- Procedure of rigging and stowing pilot ladders, including pilot hoist
- States that pilot ladders are usually reserved for pilots only

- During rigging proper PPE to be worn
- Prior usage proper inspection to be carried out.

6.1.4 Rig and unrig Bosun's chairs and staging

- Demonstrates the rigging of a bosun's chair with gantline, double sheet bend and seizing
- Demonstrates use of bosun's chair
- Demonstrates the rigging of stages and cradles
- Demonstrates a proper inspection, testing, use and stowage of bosun's chair, staging, gantline and related equipment
- Demonstrates tackling and boatswain's seam
- Self-Lowering / Hoisting 'Bosun's chair'
- Rigging a Rope ladder
- Rigging a 'Stage' on Shipside for painting
- During rigging proper PPE to be worn
- Prior usage proper inspection to be carried out.

6.1.5 Take precautions while climbing a mast

- Demonstrates the use of PPE to be worn when climbing a mast
- Demonstrates the fastening of fall arrestor
- Demonstrates keeping of both hands free and the technique of maintaining three-point contact
- Use of safety harness and the double strop

6.1.6 Blocks and Tackles

Trainee will be able to:

- Explain the purpose of using the blocks and tackles on the ships.
- State that Blocks, may be Single sheave Block, Double-sheave blocks or triple-sheave Blocks.
- Differentiate the Standing part, Hauling part, Running parts, Standing block, Moving – blocks of a tackle.
- Differentiate between various blocks and tackles.
- Explain the SWL of each block and where is it marked.
- Demonstrate overhauling of the blocks.
- State that sheaves of the block are measured by its diameter.

6.2 Contribute to the safe operation of deck equipment and machinery

6.2.1 Function and uses of valves and pumps, hoists, cranes, booms, and related equipment

- Describes the different types and function principles of pumps and valves
- Describes emergency procedures and is able to assist the OOW with testing emergency shutdown of pumps and associated valves
- Demonstrates the use of portable winches and pumps
- Describes the different types and function principles of hoists, cranes and booms

- Demonstrates basic visual checks of hoists, cranes and booms and related equipment
- States that any failure, damage or malfunction has to be reported to OOW immediately
- Demonstrates the preparation and uses different hoists, cranes and booms
- States that derricks and guys have to be moved in a combination
- Demonstrates the basic signals for the operation of the different deck equipment
- States that in case of dead spots during cargo or stores operation additional signalers have to be available
- States that booms have limiting angles
- States that cranes should not be used for dragging
- Identifies and explains safe working load (SWL) or working load limit (WWL) of equipment
- States that a load greater than SWL shall not be lifted
- Identifies SWL of shackles, chains and slings correctly
- Describes how to sling, lift and move different kind of cargo in a secure and safe manner
- Demonstrates different lashing techniques

6.2.2 Function and uses winches, windlasses, capstans and related equipment

- Describes use of the different types and function principles of capstan and winches
- Demonstrates the use of different winches, windlasses, capstans and related equipment
- Demonstrates the use of different lashing techniques

6.2.3 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists

- Demonstrate for all work involving winches, windlass and crane different hand movements used by a signaling man for guiding the crane operator as given in COSWP
- Describes the different types and function principles of cranes, derricks and winches
- Demonstrates basic visual checks of cranes, derricks, winches and related equipment
- States that any failure, damage or malfunction has to be reported to oow immediately
- Demonstrates the preparation and use of cranes, derricks and winches
- Demonstrates the basic signals for the operation of deck equipment
- States that in case of dead spots during cargo or stores operation additional signallers have to be available
- Identifies swl of shackles, chains and slings correctly
- Demonstrates how to sling, lift and move different kind of cargo in a secure and safe manner

6.2.4 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea, and in emergencies

- Safety precautions while anchoring
- Explain the method for securing anchor for sea, covering
- Spurling pipe, marking on anchor cable, use of chain hook, describe how anchors should be kept ready for use in emergency.

6.2.5 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or elevators

- Describes the safety hazards in opening/closing ramps, doors, freight elevators etc
- Describes operating ramps, doors, freight elevators etc
- States that defects in any lifting equipment and gears have to be reported immediately
- Describes the effect on ship stability and watertight integrity, if doors are unsecured

6.3 Safe working practices and personal shipboard safety of Personal & Protection Equipment- COSWP

6.3.1. Safe working practices (General)

Trainee will be able to list the different items of equipment as:

Equipment	Protection of
Safety Shoes	Feet
Safety Helmet	Head
Safety Goggles	Eyes
Hand Gloves	Hands
Ear Muffs	Ears
Boiler Suit	Body
Safety Harness	Working Aloft/overside
Face Mask	Nose, Mouth & Face
Nose Mask and Respirator	Nose and Lungs
Fall Arrestor	Working at heights
Apron	Body from chemicals

Trainee will be able to:

- Give examples, when and where to use each of the above equipment.
- Maintain the above equipment in clean, good, working condition ready for immediate use.
- State that safety of the ship and its crew would be his first priority.
- list the precautions necessary before lifting any heavy loads manually, Safe working procedures, Tools and instruments

Safe working practices (general)

- State importance of safety at Work
- Define accident as an ‘unplanned, undesirable and uncontrollable event leading to injuries, loss of life, damage to property and environment’.
- States that accidents are avoidable by being aware and due diligence.
- State type of hazards that affect a seaman’s body – mechanical, chemical, electrical, thermal, radioactive, biological, gaseous.
- State importance of using senses in recognising hazardous situation.
- State incidents that lead to injury such as Impacts, Slips, Falls, Entanglement, Burns (heat, chemical, radiation), Electric shocks, Cuts, Foreign particles in eyes, or lungs, or ingestion (through mouth), Inhalation of toxic vapour, or lack of breathable air, Sprains and other physical injuries

- Create a list of safe working practices

6.3.2. Risk Assessment (Basic)

Trainee will be able to

- Describe the concept of ‘risk assessment’ and basic approach
- State the five steps of risk assessment
- Identify hazards and place controls to minimize these hazards.
- Define "hazard" as a source of potential harm or damage or any situation which has potential for harm or damage
- Define “Risk assessment” as a careful examination of hazards that, could cause harm to 'people', 'pollution' of environment, damage to 'property' and/or loss of 'process' (rule of 4 P's)
- State that "Risk" has two elements as given below:
  - The 'likelihood' that a hazard may occur;
  - The 'consequences' of the hazardous event.
- State that "Risk" can be controlled by one or more of the below actions which are listed in the order of its effectiveness:
- Elimination;
- Substitution by something which is less hazardous and risky;
- Enclosure (enclose the hazard in a way to eliminate/ control the risk)
- Guarding/Segregating people away from the hazard;
- Device safer system of work which will reduce the risk to acceptable level
- By writing down procedures in a way which is known and understood by those affected;

6.3.3. Permit to Work System /Work-Permits/ Emergencies

- State that any operation on board ship where the actions of one person may inadvertently endanger another or where a series of actions need to be taken to ensure the safety of those engaged in that operation, a 'Permit to Work' needs to be issued before starting of the work.
- State that a "Permit-to-work" by itself will not make the job safe, but it just contributes towards measures required for safe working
- List the essential conditions to include in a 'permit to work' as given below:
- The permit should clearly state the location and details of the work to be done,the nature a nd results of any preliminary
- Tests undertaken, the measures undertaken to make the job safe and the safeguards that need to be taken during the operation.
- State purpose of ‘work Permit’, types of work permits. **Name various types of ‘Permit to Work’ as**
- Hot Work Permit
- Tank Entry Permit
- Enclosed Space Entry Permit
- Working Aloft / Overside Permit
- Electrical Isolation Permit

Trainee will be able to state that ‘Work Permits’ are required prior doing any of the following jobs on the ship:

- ‘Man entry’ into tanks.
- ‘Hot work’, anywhere on the ship.
- ‘Enclosed space entry’
- ‘Working aloft’
- ‘Working Over the side’
- ‘Lock out – Tag out’ of electrical equipment
- State that "Permit-to-Work" needs to be issued for any
- Critical jobs including:
  - Any work in Unmanned Machinery Spaces
  - Any work which requires 'Entry into any Enclosed or Confined Space'
  - Any work on any Machinery or Equipment which requires power isolation

6.3.4. Safe Access to the Ship

Trainee will be able to state that:

- Access to the ship will be either from a shore gangway or from the ship’s gangway (also called Accommodation ladder.)
- The gangway will be well secured on the ship,
- A safety net will be fixed below the gangway to protect someone falling accidentally
- Gangway will be lowered / hoisted during the rising / falling tide.
- A lifebuoy and a Heaving-line will be kept ready near the gangway for emergency use.
- Gangway will have railing and taut ropes on the sides.
- There will be a platform at the bottom end of the ship’s gangway.
- State duties of a person on the Gang Way Watch.
- State the importance verification of identity of any person coming on board.
- State procedures for reporting any abnormal movement of persons on board trespassers

6.3.5. Safe Working Practices during Berthing / Un berthing, and Anchoring

Trainee will be able to state that:

- All crew should be properly dressed up in suitable clothes, depending upon the weather.
- All crew should be wearing Safety helmet, safety shoes, hand gloves, safety goggles(when anchoring)
- Crew should not stand in the bights of mooring ropes or wires.
- Crew should be careful not to stand too close to fairleads, to avoid the back-lash of parting mooring ropes.
- Keep clear of likely snap back zones

6.3.6. Safety Precautions, when working aloft

Trainee will be able to list the following safety precautions:

- Take permission from Master, for working aloft.
- Be properly clad in Boiler suit, safety Helmet, Safety Harness, Safety shoes, Hand gloves
- Have necessary equipment for working aloft (e.g. Chipping hammers, scrapers, Paints, brushes etc) in a bucket with a heaving line.
- Have a Person standing by on deck for any assistance or emergency
- Before starting work aloft, fix the safety harness in position. Connect the fall arrestor device.

6.3.7. Safety Precautions, when working over side

Trainee will be able to list the following safety precautions:

- Take permission from the Master, for working over the side.
- Be properly clad in Boiler suit, safety Helmet, Life-Jacket, Safety shoes, Hand gloves etc.
- Have a 'stage' rigged up on the shipside, where work has to be carried out.
- Have a rope ladder fixed up securely close to the stage.
- Have necessary equipment for working over the side (e.g. Chipping hammers, Scrapers, Paints, Brushes etc) in a bucket with a heaving line.
- Have a Person standing bye on deck for any assistance or emergency

6.3.8. Safety Precautions during working in enclosed spaces

Trainee will be able to:

- Explains the term enclosed space and what constitutes enclosed space
- Identifies typical enclosed spaces and potentially dangerous spaces on board
- Knows that on each ship a certain safety procedure with regard to entry into enclosed spaces has to be followed strictly and that responsibilities are defined clearly. No entry can be made to an enclosed space unless an enclosed space entry permit is issued by senior management on board
- Has working knowledge of safe working practices with regard to the entry into an enclosed space
- Has working knowledge the procedure of donning and use of breathing apparatus

6.3.9. Safety Precautions, during manual lifting of weights

The Trainee shall:

- Estimate the weight of the package / bag / bale/ drum / bottle / pipe
- Know that alone he can lift not more than 25 kg of weight
- Know that wrong lifting position can cause serious injury to back
- Learn the correct technique of lifting different types of packages
- Keep one hand free to hold onto railing when climbing steps with weight in hand
- Use additional help for oversize and overweight packages.

6.3.10. Demonstrates working knowledge of electrical safety

The Trainee shall :

- Understands the harmful effects of direct and alternating current on human's heart and body functions
- Explains and applies the Five Safety Rules
- Has working knowledge of the function principles of electric power operated tools and equipment
- Has working knowledge of safe working practices in using electric power operated tools and equipment. Always use electrical equipment after it has been certified
- Performs function checks prior use of the equipment
- Knows that electrical equipment cannot be used in flammable atmosphere or on deck of a tanker unless they are certified intrinsically safe
- Knows the importance that any failure, damage or malfunction of electric power operated tools, electric lighting and electric equipment has to be reported to Rating in Charge immediately

6.3.11. Safety precautions when climbing fixed vertical ladders and Portable ladders

The trainee shall:

- Both hands shall be free to grip the rungs.
- Three point contact to be always maintained when climbing
- No tools / material to be carried on person or in pockets, instead tool bag should be used to hoist up the tools / material
- Portable ladders should be pitched between 65^{o} - 75^{o} from the horizontal on a firm base and secured from slipping at the bottom.
- The two halves of telescopic ladders should be locked as a composite unit prior pitching it to the correct angle.

6.3.12. Safety precautions when rigging scaffolding and using it

The trainee shall:

- Assemble scaffolding as per makers given procedure
- Safety precautions to be followed when assembling the scaffolding to prevent any falls, and back injury
- Know the SWL of the structure and ensure it is not exceeded
- Safety rails must be fitted at every deck to prevent risk of persons / objects following off.
- Take care to ensure stability and rigidity of the structure to prevent inadvertent movement.
- Scaffolding to be secured and lasted.

6.3.13. Safety precautions when handling chemicals and strong detergents

The trainee shall:

- Be aware that chemicals and strong detergents like acid, caustic soda, bleaching powder and rust removers are corrosive and can burn and penetrate the skin if it comes in contact with the body.
- Substances hazardous to health are usually packed in drums which carry the health hazard label.
- Safety Data Sheets (SDs) should be referred to know their properties prior use.
- Wear suitable protective clothing (face mask, gloves, apron, boots) prior handling chemical drums.
- Always pour chemical in a container of water for dilution and not vice versa.
- Ensure space is well ventilated, to disperse toxic fumes emanating from the chemical.

6.3.14. Communicate with other persons on board on elementary safety matters understand safety Information symbols, signs and alarm signals

The trainee shall:

- Understands the information and instructions of superiors and colleagues
- Understands safety information symbols, signs and alarm signals and is able to respond appropriately
- Reads and understands safety posters and abides by the instructions
- Identify the color codes used for following 'Safety Signs' on board and their meaning:
  - Prohibitory Signs
  - Warning Signs
  - Mandatory Signs
  - Emergency escape and First Aid signs
  - Fire Fighting equipment sign
- Identify the color codes used for identifying gas cylinders, pipe lines and fire extinguishers on board

6.3.15. Shipping Organization (National) & documents for seafarers

Trainee will be able to state the major role of the following:

- Directorate General of Shipping (DGS)
- Mercantile Marine Department (MMD)
- Shipping Master
- Seamen's Provident Fund Organisation
- Seamen's Welfare Fund Society

Trainee will be aware of the existence, and able to explain the purpose of a Ship's

- Official Log Book
- Deck Log Book & Engine Room Log Book
- 'Articles of Agreement' of a ship and what it is used for.

Trainee will be able to:

- Explain what is meant by C.D.C and what it is used for?
- Explain the contents of C.D.C.
- Explain that offences against discipline are recorded in ship's official log-book and suitable penalties are awarded.
- Explain the importance of Contract of Employment, Collective Bargaining Agreement.
- Explain the need and contents of Seafarers Identity Document (SID).
- Explain function of Recruitment and Placement Agencies (RPS).
- Understand and be aware of Recruitment and Placement Rules and contents.
- Explain the purpose of articles of Agreement and its contents relating to Indian flag and Foreign Flag ships.
- Explain the importance of INDoS No.
- Understand and be aware of rights of a seaman.

6.3.16. International Organizations and Conventions

Trainee will be able to understand and explain

IMO	International Maritime Organization
STCW (STW)	(International) Standard of Training, Certification, and Watch Keeping
SOLAS	Safety of Life at Sea
ISM	International Safety Management Code
MARPOL	International Convention for the Prevention of Pollution from Ships
PSC	Port State Control
ISPS code	International Ship and Port Security Code
ILO	International Labour Organization
MLC	Maritime Labour Convention
PHO	Port Health Rating
	Customs and Immigration

Trainee will be able to state the role of the following:

a. Port State Control (PSC)
b. Flag State Inspections (FSI)
c. Port Health
d. Customs
e. Immigration

6.3.17 Duties of a Gangway Watch in Port (intro to ISPS Code)

The trainee will be able to:

- State duties of a person on the Gang Way Watch.
- State the importance verification of identity of any person coming on board.
- State procedures for reporting any abnormal movement of persons on board trespassers.

6.4 Knowledge of flags and flag work

6.4.1 Demonstrate knowledge and understanding of hoisting

- Dipping flags and the main single, National flag,
- Courtesy flag, company flag, independent pendants
- Demonstrates the hoisting of a flag
- Recognizes and states the meaning of the main single flag signals
- Demonstrates dipping the national flag upon order

6.4.2 Flag signals. A

- Identify the colour and understand the meaning and purpose of Flag signal A

6.4.3 Flag signals .B

- Identify the colour and understand the meaning and purpose of Flag signal B

6.4.4 Flag signals. G

- Identify the colour and understand the meaning and purpose of Flag signal G

6.4.5 Flag signals. H

- Identify the colour and understand the meaning and purpose of Flag signal H

6.4.6 Flag signals. O

- Identify the colour and understand the meaning and purpose of Flag signal O

6.4.7 Flag signals .P,

- Identify the colour and understand the meaning and purpose of Flag signal P

6.4.8 Flag signals. Q

- Identify the colour and understand the meaning and purpose of Flag signal Q

6.5 Apply precautions and contribute to the prevention of pollution of the marine environment

6.5.1 Sources of Pollution from ships

- Oil /Oily mixture /Oil fuel /Oil tanker for tanks and bilges

- Chemicals and noxious liquids
- Pollutants in packaged form
- Sewage generated from human excretia
- Garbage of food waste, packing material, etc
- Pollution of air by discharge of gas and fumes
- Transference of alien acquatic species through ballast water
- Use of tin based anti-fouling paints

6.5.2 Damage caused by ships to the environment

- State that ships are a cause for pollution of the sea and the air and this needs to be controlled.
- State the conditions under which oily mixtures may be discharged into the sea from an oil tanker
- State the condition under which oily mixtures from machinery space bilges may be discharged into the sea
- State that residues which cannot be discharged into the sea in compliance with the regulations
- Must be retained onboard or discharged to reception facilities

6.5.3 Importance of prevention of pollution of the sea and means of preventing pollution. Basic knowledge of MARPOL 73/78

- The International convention for the prevention of pollution from ships, 1973 as modified by the protocol of 1978 relating thereto (MARPOL 73/78) including brief history of convention.
- List the Annexes to the MARPOL Convention
- States that the marine environment has to be protected
- States that marine pollutants must be landed ashore for safe disposal in compliance with marpol 73/78, as amended
- States that there are strict rules covering disposal of oily water mixture that are mandatory for all ships
- Special area
- State that the provisions do not apply to the discharge of clean or segregated ballast
- States that there are strict rules covering disposal of noxious liquid substances that are mandatory for all ships
- States that there are strict rules covering disposal of harmful substances in packaged form that are mandatory for all ships
- States that there are strict rules covering pollution prevention by sewage that are mandatory for all ships
- States that there are strict rules covering pollution prevention by garbage that are mandatory for all ships
- States that there are strict rules covering air pollution from ships that are mandatory for all ships

6.5.4 Proactive measures to protect the marine environment

- Describes the use of deck scuppers for bunkering purposes
- Describes assistance during bunkering operations

- Describes the use of emergency stop during bunkering
- Recognizes the need to seek advice if unsure of measures to be taken

6.5.5 Knowledge of the use and operation of anti-pollution equipment

Demonstrate knowledge and use of :

- Oil boom 3m x dia. 13m
- Oil pads 50 x 40cm
- Saw dust bags
- PVC protective gloves
- Disposal bags
- Air driven pump
- Scoops and shovels
- Buckets and drums for collection.
- Describes emergency response exercises for controlling spillage of oil on board
- Demonstrates the duties assigned to the crew as per SOPEP
- Describes drills for clean-up of hazardous cargo spillage
- Demonstrates operating garbage compactor unit (where fitted)
- State the requirements for the provision of Oil Record Books

6.5.6 Disposal of Garbage

- Demonstrates collecting and segregating waste and garbage
- Demonstrates collecting and disposing of cargo sweepings
- States the need to segregate waste, record amounts and land ashore for disposal
- Defines for the purpose of Annex V
- Garbage nearest land Special area
- States that the disposal into the sea of all plastics is prohibited
- States the regulations concerning the disposal of other garbage
- List the entries to be made in the garbage record book
- Disposal requirements for expired medicines, expired pyrotechnics, batteries and tube lights.
- Outline knowledge of Garbage Management Plan

6.5.7 Exchange of ballast water

- States the purpose behind ballast water exchange
- State that 'The International Convention for the Control and Management of Ships' Ballast Water and Sediments' requires that all Ships are required to have on board and implement a 'Ballast Water Management Plan' which is approved by the Administration
- State that above regulation is aimed at preventing the transfer and spread of harmful aquatic organisms and pathogens from one part of the world to other through Ship's Ballast water
- State that under this regulation, it is required that ships must have a 'Ballast Water Record Book' which is used for recording the location, date and time at which ballast water is taken on board and discharged back into the sea.
- State that under this regulation, if it is decided to do 'Ballast Water Exchange' at sea, it should be done preferably at distances > 200 NM from nearest land and in depths > 200 m

- If above not possible due to the limitations along ship's route then atleast at distances not less than 50 NM from nearest land and in depths > 200 m

Appendix 1 G

Part 7 - Maintenance and Repair at Support Level (A-II/5 & A-III/5)

Specific Learning Objectives

Parts/Title	T Hrs	Practical/ Skill Hours	Total Hrs	Wks
Part 7 Maintenance and Repair at Support Level (A-II/5 & A-III/5)	**20**	**180**	**200**	**4.76**

		Theory	Practical
7.1	**Surface Preparation and Painting** 7.1.1. Identification of condition of corrosion on the surface 7.1.2. Hand and power tools used for surface preparation 7.1.3. Maintenance of Power tools 7.1.4. Safe working practice during surface preparation 7.1.5. Procedure for cleaning surface prior paint application 7.1.6. Paint types 7.1.7. Tools for paint application 7.1.8. Sequence of paint coatings 7.1.9. Disposal of paint residues, solvents, sweepings.	**10**	**50**
7.2	**Lubrication** 7.2.1 Lubrication plan for the ship 7.2.2 Types of lubricants 7.2.3 Equipment used for lubrication 7.2.4 Safe working practice when using lubrication equipment	**3**	**20**
7.3	**Chemicals for Cleaning** 7.3.1 Hazards of use of chemicals 7.3.2 Stowage of chemicals 7.3.3 Safety Data Sheets for chemicals 7.3.4 Safe working practice when using chemicals	**2**	**10**
7.4	**Repairs** 7.4.1 Precautions to be used when carrying out hot work 7.4.2 Use of cutting and welding equipment to the level of 2G welder 7.4.3 Use of drill bits, cutting blades and abrasive wheels 7.4.4 Join and Secure components 7.4.5 Lathe work – fabrication of components using machine tools 7.4.6 Plumbing repairs 7.4.7 Carpentry to prepare cement box and other wood repairs	**5**	**100**
		20	**180**

7.1 Surface Preparation and Painting

7.1.1 Identification of condition of corrosion on the surface

- Explain Corrosion Prevention
- Describe the Galvanic and Bimetallic corrosion, Sacrificial Anodes
- Explain the method of surface preparation and Painting above and below the water level
- State the causes of corrosion in cargo spaces and ballast tanks and explain how extent of corrosion can be identified and prevented.
- Describe the various factors which can affect the Corrosion of steel
- Humidity / Availability of Oxygen / Temperature / Velocity of Ship:
- Describe the different types of Corrosion in Steel
- Corrosion along Cavitation
- Impingement Corrosion
- Bimetallic Corrosion
- Stress Corrosion
- Crevice corrosion

Trainee will be able to explain that:

- Steel plates must be protected against exposure to air & moisture, to prevent corrosion.
- This is done by painting the steel plates or structures.

7.1.2 Hand and power tools used for surface preparation

- Prior to painting, the surface of the plates must be thoroughly chipped of rust, or old paint, wire brushed, then washed, cleaned and dried.
- Tools used for chipping are, chipping hammers, scrapers, wire brushes, sanding discs chipping Machines, needle, guns etc.
- Use of high pressure hydro blasting machines and grit blasting machines
- All Power operated Tools and Equipments should only be operated by a competent person having adequate training
- Explain that the flexible power cables used shall be of good standard and be marked accordingly
- Explain that the power cables shall be laid clear of all damaging obstructions and should not obstruct
- Explain that the safe passage for Cable’s wherever they pass through any doorways, the doors shall be secured open to prevent cutting of wires all precautions shall be taken to prevent any electrocution.
- Where the work is being done in confined locations with damp, humid and conductive Surfaces. Any fittings to the tool equipment like Abrasive wheels, wire brushes, discs etc. Should be secured tight to prevent them working loose and flying away during operation.
- Equipment remain connected to the power source. Any built-in safety devices like Retaining springs, clamps, locking levers etc. Should be refitted immediately after the Tool piece is changed.

- Any safety guards should be securely fixed on all appliances which requires them and Should be checked before starting any operation.
- During temporary interruptions to work (e.g. Meal breaks, and on completion of a task), Equipment should be isolated from power sources and left safely or stowed away correctly.
- When a power tool operation causes high noise levels, hearing protection shall be worn.

7.1.3 Maintenance of Power tools

- Explain that preventing hazards associated with the use of hand and power tools through maintenance Constant care and adequate maintenance and storage are essential for the safe use of portable tools on vessels for maintenance.
- Explain that In practice, this involves daily visual inspections aimed at detecting signs of possible fault;
- Explain that Items requiring attention should be reported. Examine each tool for damage before use Check that the guards are present and secure Check wheels and blades for cracks Check electrical cords, connections, Earthing.
- Explain that many electrical accidents are caused by faulty flexible cables, extension leads, plugs and sockets .All portable tools that are damaged should be removed from use and tagged “Do Not Use” Keep tools sharp and clean.
- Do not try to tape cords Follow instructions in the user’s manual for lubricating and changing accessories Maintain tools according to the manufacturer’s specifications to avoid worsening vibration: Replace vibration mountings before they are worn out Check rotating parts for balance and replace them if necessary Keep tools sharp.

7.1.4 Safe working practice during surface preparation

- Always wear personal protective equipment (PPE) such as goggles, helmet, gloves, safety shoes etc. While doing chipping and cleaning operations
- Make sure that the work area is clear off of all obstacles and take a look on the safest and nearest escape route While doing chipping, scraping, wire brushing etc. Always ensure you are wearing goggles and mask. The most common injury in such operation is the eye injury
- Maintenance work also includes removing of old paint and applying a new coat at regular interval of time. This process requires operations such as chipping, scrapping, wire brushing etc.
- Always Wear safety mask to avoid inhaling of rusty dust and metal flakes ¬ Wear ear protection when chipping out deck or heavy metals.
- Always know the shut down switch or system when working on electric or pneumatic machines such as chippers and scrappers Hold the chipping machines correctly to avoid injury to hands Ensure your hands are not oily or greasy before using any cleaning tools such as chipper, scrapper, or brush ¬
- Ensure if you are cleaning overhead area, ensure that the area is clear and there is no risk of falling objects ¬
- If cleaning near machinery, ensure that you are well away from the operating range of the machines ¬
- If cleaning some machinery, ensure that the machine is switched off and tagged ¬
- If using chemicals for cleaning purpose take all precaution as stated in the “Handling Chemical” section below ¬

- When working on blaster for cleaning deck surfaces, know all the operation and shut down the system of the machine ¬ Hydro blaster operates with high hydraulic pressure (1000 bars).
- De-energize all equipment in areas being painted, as appropriate ¬ Do not paint in any area where welding is being performed ¬ No hot work should be done in the vicinity of area being painted ¬ Do not smoke when painting. Post "NO SMOKING" signs in the area(s) being painted ¬ Take precautions to prevent vapour.

7.1.5 Procedure for cleaning surface prior paint application

- Clean all surfaces using water soluble detergent and high pressure fresh water.
- Remove salt, oil, grease, loose coating, dirt and detergent prior to de-rusting.
- Understands the importance of preparing the paint before application
- After de-rusting remember to remove all particles etc. from the prepared surface prior to painting. Explain NOT use the working air available on deck.
- Paint immediately after the surface is prepared – in order to avoid contamination, increased salt levels and flash rust on bare metals.

7.1.6 Paint types

- Types of paint coatings and areas where they are applied.
- Shelf life, pot life, over coating intervals, dry and film thickness.
- Boot topping paint is applied to shipside plates near the ship's waterline.
- Anti-fouling paint is applied to the underwater shipside plates in the dry-dock.
- Anti-fouling paint does not allow the marine growth to take place on the shipside.

7.1.7 Tools for paint application

- Having working knowledge of brush application
- Application of paint by brush is recommended for patch priming and repair work to ensure good wetting of the substrate. This is essential when painting over manually prepared surfaces.
- The choice of brush will depend upon the application required and the quality of finish to be achieved. Flat square end brushes, often called wall brushes, are used on flat areas, while angular cut 'sash' brushes are used on narrow surfaces, and round or elliptical section brushes are used on irregular shapes such as nuts and bolts. Brushes with angled heads and long handles are used for painting the backs of stiffening bars and other inaccessible areas in tanks.
- Brushes should not be dipped into the paint more than half the length of their bristles, the aim is to load the brush with enough paint to get some work done, but not too much so the paint drips and splatters. The applied paint should spread evenly using smooth, steady strokes then be smoothed by light parallel strokes to eliminate irregularities. On flat, vertical surfaces, it is best to finally lay off the paint in a vertical direction because this will reduce the tendency of the paint to run or sag. Particular attention should be paid in ensuring that the applied paint is brushed into the bottom of pitted areas of steel and that the edges of nuts etc. are well coated.
- Having working knowledge of roller application
- Rollers are useful for applying paint to large flat areas such as tank tops, vertical sides, walkways and deck areas. Roller application requires less skill from painters than brush application. The most common roller fabrics used are lamb's wool and mohair.

- When applying paint, immerse the roller into the paint tray, roll it in the paint until fully saturated, and then roll it back and forth on the tray ramp to remove all excess material. This not only avoids the problems of drips and spatters, but ensures that the roller is fully wetted and that air is removed from the fibre pile. Pitted areas should be touched up by brush before roller application.
- The following table gives a simple comparison between brush and roller paint application:

	Advantages	Disadvantages
Brush	Good for small, complex areas	They require more coats to achieve film thickness
	Inexpensive equipment	
	Minimal wastage	
Roller	Faster than brushing	They require more coats to achieve correct film thickness
	Good for large flat areas	Possibility of uneven film thickness

- Having working knowledge of spray application
- In spray application, the paint is atomized into fine droplets and projected onto the surface to be protected where the droplets join together to form a continuous film. The atomization can be accomplished in a number of ways.
- In air spraying, the paint is atomized by mixing it with a stream of compressed air in a conventional spray gun. The paint can be either sucked into the air stream (as in the simple suction cup gun used for application to small areas) or fed to the spray gun under pressure from a pressure pot. For ideal application, careful adjustments of the spray nozzle and air pressures must be made by a skilled operator, according to the consistency and composition of the paint product and the film thickness required.
- For airless spraying, the paint is hydraulically compressed and, on release through a small orifice in an airless spray gun, it is atomized and projected onto the surface. By changing the orifice size and shape and by varying the hydraulic pressure, atomization can be accomplished for a wide range of paint consistencies from thin to thick, to give a wide range of rates of deposition. The equipment required is much more expensive than for air-assisted spraying, because it must withstand the much higher pressures involved. For air-assisted spraying, the maximum air pressure will normally not exceed 690 kPa (100 psi); for airless spraying, hydraulic pressures of up to 27,500 kPa (4,000 psi) may be required.
- After operation, the paint spraying equipment should be treated as follows:
- Wash the unit by circulating fresh thinner slowly for about 15 to 20 minutes;
- Remove the suction filter and material filter, and clean them;
- Wash the nozzle sufficiently in the thinner. If it is expected to be used within a few days, it should be soaked in thinner;
- When the system is not expected to be used for a long time, the valve ball of the material cylinder should be cleaned and oiled to prevent it from jamming.
- Having basic working knowledge of applying paint
- Never mix excessive thinner, otherwise, in the case of painting of walls, paint tends to drip and prohibits obtaining a thick coat.
- Distribute the paint well and even, and avoid applying too heavy a film thickness causing through-drying problems and wrinkling. It is always better to apply two thin coats than one thick coat.
- The painting sequence should be from the far side to the near side, from top to bottom and the complicated places should be painted first.

- Tools used for painting on the ship, are paint brushes, roller Brushes, and spray machines.
- Has working knowledge of brush application
- Has working knowledge of roller application
- Has working knowledge of spray application
- Has basic working knowledge of method of applying paint
- Paint brushes must be cleaned after every use, dried and then stored for future use.
- For pitted and difficult to reach areas and for primer application direct on steel, brush application is recommended.
- Good quality natural fibre or synthetic brushes.
- Brushes must be clean before re-using them for other different paints.
- Dip the brush often to keep it well filled with paint
- Do not dip the brush deeper than half the length of its hairs.
- On flat, vertical surfaces, apply the last stroke of paint in a vertical direction to reduce sagging.
- When paint application is done with a roller, use a roller board to assure an even distribution of paint on the roller. Pitted areas should be touched up by brush before roller application
- Rollers must be clean.
- Phenolic rollers with short hair are recommended
- Dip the roller often to keep it well filled with paint
- Over rolling can cause paint pick up, specially associated with fast drying pain
- Finish by rolling in one direction to ensure a uniform finish.

7.1.8 Sequence of paint coatings

Basic knowledge of coating sequences

- In a typical protective paint coating sequence, three types of coatings are used: a primer, an intermediate coat, and a topcoat. Each coating 'layer' in any protective system has a specific function. Incorrect sequence of a paint coating will result in deteriorated protective function and reduced performance or complete failure of the paintwork.

- Importance of following manufacturers' instructions
- Manufacturers require a specific coating sequence for some coatings. It should be ensured under such circumstance that proper product is used for different layer of coats, as instructed by the manufacturers.
- After cleaning, first coat of paint should be anti-corrosive paint or Primer paint. This is always by a brush.
- Second coat, followed by third coat, should also be the same, but after the first coat has dried.
- A stripe coat is applied at the corners and edges using a brush.
- Final coat of the paint should be the 'Finishing paint'.
- Where finishing paint is White, one additional coat of undercoat is applied.
- It is essential that the paint is well mixed prior painting. For two pack epoxy paints, the packs to be mixed in correct preparation using a mechanical impeller
- Knows that certain parts on deck may not be painted
- Paints give off combustible gases, therefore the paint locker must be well ventilated before entry.
- Precautions and procedure of using spray painting machine.

- Each ship provided with a paint coating plan by the paints manufacturer. This details which paint is to be applied where. This is accompanied with product data sheet for each paint type.
- Knows the care and maintenance practice of surface preparation and painting equipment.

7.1.9 Disposal of paint residues, solvents, sweepings.

- Solid wastes (including slurries) that are collected on board during normal maintenance or operations of a ship, or used for cargo stowage and handling. Operational wastes also includes cleaning agents and additives contained in cargo hold and external wash water that may be harmful to the aquatic environment.

7.2 Lubrication

7.2.1 Lubrication plan for the ship

- Working knowledge of lubricating moving parts of deck equipment

- All weather deck equipment must be lubricated properly to ensure protection against wear and weather elements. All moving parts of the system must be working freely, and sufficiently greased or oiled. The maintenance and lubrication of heavy deck equipment, such as winches, cranes, and anchor windlasses, should be carried out regularly.In order to maintain good work condition, windlasses, winches, blocks, chocks and other moving parts on deck need to be lubricated or greased periodically, as follows:

- Knowledge of ship's lubrication plan
- Understand that for different machinery and equipment different types of fluids, lubricants or grease are applied

No.	Equipment	Maintenance	Suggested Frequency
1	windlasses	lubrication and grease	once a voyage
2	winches	lubrication and grease	once a voyage
3	blocks, tackles	lubrication and grease	quarterly
4	chocks, fairlead rollers	lubrication and grease	quarterly
5	all kinds of hinges	lubrication and grease	quarterly
6	ventilation equipment	lubrication and grease	quarterly

- Knows the different types of grease nipples available
- Knows that all moving parts need to be lubricated otherwise the surfaces due to friction will wear out
- Knows the procedure of greasing windlass, winches, blocks, chocks, drums, wheels, cleats, dogs, nuts etc.
- Knows the procedure of greasing wires.
- Knowledge of selecting and using different types of grease gun or lubricating equipment

- Knows the care and maintenance practice of lubricating equipment

7.2.2 Types of lubricants

Explain to trainees regarding

- When selecting and using correct fluids, lubricants or grease, the several factors should be taken into account, such as service temperature range, speed, extreme pressure, fretting etc. In general, the principle is to follow the instructions of manufacturers of the equipment to be lubricated or greased
- Various types of LUBE oils
- Various types of Grease used on board the vessel
- Importance of Cylinder oil and Lube Oil
- Importance of Normal and gear grease
- Importance of wire grease
- Application procedure for grease

7.2.3 Equipment used for lubrication

- A grease gun is a common tool used for lubrication. The purpose of the grease gun is to apply lubricant through an aperture to a specific point, usually on a grease fitting or 'nipple'. The channels behind the grease nipple lead to where the lubrication is needed. The aperture may be of a type that fits closely with a receiving aperture on any number of mechanical devices. The close fitting of the apertures ensures that lubricant is applied only where needed. The grease gun is charged or loaded with any of the various types of lubricants, but usually a thicker heavier type of grease is used.
- Different types of grease guns demand different ways of operation:
- Hand-powered, where the grease is forced from the aperture by back-pressure built up by hand cranking the trigger mechanism of the gun, which applies pressure to a spring mechanism behind the lubricant, thus forcing grease through the aperture.
- Hand-powered, where there is no trigger mechanism, and the grease is forced through the aperture by the back-pressure built up by pushing on the butt of the grease gun, which slides a piston through the body of the tool, pumping grease out of the aperture.
- Air-powered (pneumatic), where compressed air is directed to the gun by hoses, the air pressure serving to force the grease through the aperture.
- Explain use of hand grease gun
- Explain use of pneumatic grease gun
- Different types of nipples in use
- Different types of adaptors in use

7.2.4 Safe working practice when using lubrication equipment

Trainees should be able to :

- Understand that damaged attachments and accessories can lead to personal injury and material damage.
- Ensure Suction and pressure pipes must not be kinked, twisted or stretched.
- Esure attachments and accessories are checked for wear, splits or other damage at all times.
- Ensure that defective accessories are replaced immediately
- Explain that overpressure may cause damages of grease gun head and its accessories. Ensure while working with the pump please do wear suitable safety equipments (leather gloves, protective glasses).

- Explain that Never to point the high pressure grease control gun on parts of your own body or on other persons standing nearby

7.3 Chemicals for Cleaning

7.3.1 Hazards of use of chemicals

- Explain the exposure to chemical substances such as cleaning solvents, detergents, fuel, welding fumes, paints, pesticides, fumigants, etc. routinely used aboard ship for operation and maintenance purposes.
- Explain the exposure to chemical substances carried by ship as cargo e.g., petrochemicals, LNG, acrylonitrile, butadiene, carbon tetrachloride, ethylene dibromide, etc.

7.3.2 Stowage of chemicals

- Toxic and other hazardous substances and products should be used and stored in such a way that users and others are safeguarded against accidents, injuries or particular discomfort.
- If possible, the substance should be stored in the original packaging or in another correspondingly labelled packaging that cannot give rise to confusion. Such substances must be stored in a locked, well-ventilated room.
- Chemicals should always be handled with extreme care, protection should be worn and the manufacturer's instructions closely followed. Particular attention should be paid to protecting eyes.

7.3.3 Safety Data Sheets for chemicals

- A record (product data sheet) should, when obtainable, be kept on board, available to all users, containing sufficient information to determine the degree of the danger posed by the substances.
- Some cleaning agents, such as caustic soda and bleach, are chemicals and may burn the skin. A chemical from an unlabelled container should never be used.

7.3.4 Safe working practice when using chemicals

- Exposure to certain substances such as mineral oils, natural solvents and chemicals, including domestic cleaning agents and detergents, may cause dermatitis. Suitable gloves should be worn when using such substances and the owner should provide suitable barrier creams which may help to protect the skin.
- The IMO/WHO/ILO Medical First Aid Guide should be consulted for accidents involving chemicals.

7.4 Repairs

7.4.1 Precautions to be used when carrying out hot work

- Demonstrate that Welding, flame-cutting and other hot work operations should be conducted within the "permit-to-work" system whenever carried out in a non workshop location.
- Explain that operators should be competent and familiar with the equipment to be used, which should be inspected by a competent person before use.

- All Seafarers should be given careful instructions if special precautions need to be taken.
- Explain that harmful fumes may be produced and oxygen depleted during operations.
- If hot work in enclosed space need to be done than Special care should be taken during operations in enclosed places.
- Explain that an assistant should be in continuous attendance and be instructed in emergency procedures.

7.4.2 Use of cutting and welding equipment to the level of 2G welder.

- Prevent injury to personnel, extreme caution should be exercised when using any types of welding equipment. Injury can result from fire, explosions, electric shock, or harmful agents. Both the general and specific safety precautions listed below must be strictly observed by workers who weld or cut metals.
- Advise regarding not to permit unauthorized persons to use welding or cutting equipment.
- Ensure to remove all flammable material, such as cotton, oil, gasoline, etc., from the vicinity of welding.
- Before welding or cutting, warm those in close proximity who are not protected to wear proper clothing or goggles.
- Ensure to remove any assembled parts from the component being welded that may become warped or otherwise damaged by the welding process.
- Advise not leave hot rejected electrode stubs, steel scrap, or tools on the floor or around the welding equipment. Accidents and/or fires may occur.
- Ensure to keep a suitable fire extinguisher nearby at all times. Ensure the fire extinguisher is in operable condition.
- Ensure to mark all hot metal after welding operations are completed. Soapstone is commonly used for this purpose.

Personal protective equipment

- General. The electric arc is a very powerful source of light, including visible, ultraviolet, and infrared. Protective clothing and equipment must be worn during all welding operations. During all oxyacetylene welding and cutting proccesses, operators must use safety goggles to protect the eyes from heat, glare, and flying fragments of hot metals. During all electric welding processes, operators must use safety goggles and a hand shield or helmet equipped with a suitable filter glass to protect against the intense ultraviolet and infrared rays. When others are in the vicinity of the electric welding processes, the area must be screened so the arc cannot be seen either directly or by reflection from glass or metal.
- Use of Helmets and Shields.
- Use of Safety Goggles.
- Use of Protective Clothing.
- Use of Protective Equipment.
- Where there is exposure to sharp or heavy falling objects or a hazard of bumping in confined spaces, hard hats or head protectors must be used.
- For welding and cutting overhead or in confined spaces, steel-toed boots and ear protection must also be used.
- When welding in any area, the operation should be adequately screened to protect nearby workers or passers-by from the glare of welding.

7.4.3 Use of drill bits, cutting blades and abrasive wheels

- The correct selection of drill bit, cutting blade and abrasive wheel etc. is essential for accomplishing an intended specific job.
- Take drill bit for an example which is a cutting tool used to remove material to create holes. Because different projects have different needs, drill bits come in a variety of shapes and are made from different materials based on the task they are designed to perform.
- Choosing the wrong drill bit can lead to structural flaws in the project, broken bits, and even damaged drills.
- Selecting a bit that is made from the right material will help ensure the hole drilled has a smooth edge and that none of the equipment being used is damaged in the process.
- The best way to determine what drill bit is right for the job is to have an understanding of all the available types and make an informed decision based on that understanding.
- Use of blades and wheels, ensure the equipment is in good working condition
- All cables are well secured and not cut and taped condition.
- Ensure all safety guards are fitted in position.
- Use the right RPM of the blade and wheel as per machine RPM.

7.4.4 Join and Secure components

- Basic knowledge of securing components with screws, nuts and locking elements
- All securing devices must be certified; if not, the reliability must be confirmed before application. When used in combination, the respective maximum securing load must be considered, and the minimum securing load serves as the load of the whole securing system.
- Familiar with the maintenance of threads
- Threads should be kept greased. Screw the securing cap on the plug tightly to the threaded sleeve on the receptacle to ensure full pin contact. Check thread conditions both in shaft and nuts and the locking arrangement for the nut. Inspect the thread at the forward to make sure that there is no cracking or potential cracking. Check the nut and the locking arrangements to see that they are in order. Threads should be carefully examined for cracks, particularly at keyways.

7.4.5 Lathe work – fabrication of components using machine tools

- Pre-Use Safety
- Ensure to Read the user manual, including all safety procedures, before you start work.
- Examine the lathe for any loose, damaged or missing parts and be certain that all guards and shields are in place.
- Lathe cutting tools should shall be sharp.
- Do not use the lathe if you notice any problems.
- Use Protective Eyewear
- Lathes can easily catch long sleeves and loose clothing. It's best to wear short sleeves or long sleeves with fitted cuffs that cannot get caught and drawn into the lathe
- Securing Work and Starting the Lathe
- Before you begin working the lathe, make sure the work piece is centered and tightly clamped to the lathe's chuck. Adjust the cutting tool and rest so that they are just above the center of the work piece. Cutting Safety
- Ensure as you cut with the lathe, to follow the manufacturer's recommendations for rotation speed, feed and depth of cut for the material you are working on.

- Never use your hand to stop a moving chuck. Instead, move the cutting tool away from the metal, turn off the lathe and remove the work piece.
- Clean Up Safety
- Thoroughly clean your work area after using the lathe. Sweep up any metal pieces from the floor or work area with a brush or broom. Do not touch the metal pieces with your hands as they may cut or burn you.

7.4.6 Plumbing repairs

- Switch off relevant pumps; isolate the affected section of pipe by closing valves or by fitting blank flanges
- Investigate the source of the leakage and make a temporary repair by binding or clamping. At the first opportunity, have the pipe repaired or renewed by a specialist repair shop
- Avoid getting electrical equipment wet. If electrical equipment is wet, take care to avoid electric shock hazards. Switch off electrical equipment
- Inspect exposed piping and pipes in wet or damp locations at regular intervals as set down in the ship's maintenance schedule. Look for breakdown of the protective coating. Check for frictional wear at pipe clips and expansion joints
- Inspect the inside of pipes where they connect to pumps and refrigeration equipment; this may require the removal of a length of pipe. Look for cracks caused by erosion
- Inspect copper pipes for signs of green colouring, which indicates corrosion
- Check bends and supports for fatigue corrosion that can occur when piping is subject to vibration. If a pipe does vibrate, fit additional clips or supports check a pipe's threaded connection where it is attached to a component made of different material. Look for galvanic corrosion
- Check fixed expansion joints (bellows) for deformation. Look for distortion that can occur with overpressure. These joints are designed to withstand twice the pipe's normal working pressure. They are not designed to accommodate pipe misalignment. Deformed bellows must be replaced
- Check for localised leakage as this can cause accelerated corrosion. Inspect glands on valves fitted in saltwater ballast lines and seawater cooling pipes. Repair all leaks, irrespective of size • open and close line valves at scheduled intervals, especially those used infrequently. Pay special attention to valves that connect to the shell.

7.4.7 Carpentry to prepare cement box and other wood repairs

- Importance of the subject introduction with workshop safety precautions, fire fighting equipment's etc.
- Identification of hand tools demonstration and using measuring, sawing practice using different types of saws, and plains etc.
- Planning practice: planning face side face edge marks use , of marking gauge etc , testing of accuracy flatness , twist ness of surface . use of straight edge bench stop , try square , cross planning , edge planning , planning piece of size , grinding , sharpening of plan blade etc .
- Demonstration and making of joints. Framing joints: halving joints,
- Defects and diseases of timber, their causes and remedies (natural and artificial), decaying of timber insects, which attack timber. Sawing of timber, types of sawing
- Prepare a sample cement box , uses of cement box on board a ship

Appendix 1H

Part 8 - STCW Mandatory courses to be completed during the running of the GP Rating Pre-Sea Course

Title
Part 8 STCW Mandatory Courses and Ship Visit
• Proficiency in Survival Techniques
• Elementary First Aid
• Fire Prevention and Fire Fighting
• Personal Safety and Social Responsibility
• Security Training for Seafarers with Designated Security Duties

Port/Dock/harbour/Ship Visit

Instructors should explain in elementary detail, the basic functions of the following spaces & equipment, and also in elementary detail, the operations listed below:

- Windlass / Mooring Winch
- Berthing & Unberthing Operations – Handling of ropes on stations.
- Mooring Ropes / Wires
- Cargo Work. – Very basic ideas only.
- Operations of Cranes & Derricks.
- Gangway, Pilot Ladders.
- Crew Accommodation, Cabins, Galleys , Pantry
- Flag Hoisting, Courtesy Flags.
- Engine Room Main engines, propeller shaft, propeller, generators, control rooms, bilges, pumps, etc.

Trainees will write an essay on the visit, and show it to the external examiner on demand.

Appendix 1 I

Recommended Practical Skills Training

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination.

All Practical Exercises done to be recorded in a Practical Skill Training Record Book.

Part 1 Maritime English & General Ship Knowledge

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J-To be written in the Journal	Signature of the Instructor on assessment of proficiency of the trainee, and date
Practical exercise for Part 1 Maritime English & General Ship Knowledge Total -30 hours			
Maritime English-12 Hrs			
1	**E**	English speaking, reading, writing (Reading and understanding of various articles and news-papers on a daily basis)	
1.	**E**	Maritime English-Oral communication by use of standard marine communication phrases(SMCP)	
2.	**E**	Ability to read and comprehend safety instructions, posters, procedures from safety management system manuals	
3.	**E**	Understand verbal communication and reply using maritime English(use may be made of English language software)	
Computer Familiarisation (12 hrs)			
4.	**E**	Explain types of Input Devices (Keyboard, Mouse, Pen, and Touch Screen Scanners, Output Devices (Monitor, printer, Speakers, Projectors) and of Storage Devices (Hard Disks, CD-ROMS, DVD-ROMS, USB Storage). Operate computer and its peripherals.	
5.	**E**	Booting the computer. Common start-up errors and their remedies. Connecting peripherals – keyboard, mouse, monitor, power cables, UPS to the computer and checking all connections. Demonstrate procedure for the installation of setting up a new computer along with other peripherals (keyboard, scanner, printer)	
6.	**E**	Demonstrate Keyboard layout and functions of different keys. Demonstrate Proper shut down of PC, and explain precautions to avoid an improper shut down Identifying the different hardware parts in the PC.	

7.	**E**	Explain types of Central Processing Unit (Processors, RAM, ROM).	
8.	**E**	Demonstrate procedure for installation / replacement / maintenance procedures for hard disk and other peripherals	
9.	**E**	Explain the need for keeping a back up of all data on ships.	
10.	**D**	MS WORD Create and save documentation. Open, find, and rename files and folders. Use "Print" commands. Use "Paragraph" options, "Bullets" and "Numbering". Use "Formatting Toolbar". Use spelling and grammar checks in the document. Use "Headers and Footers". Insert symbols and pictures. Create tables in MS-Word.	
11.	**D**	MS EXCEL Create workbooks, working with rows, columns, cells and worksheets. Insert pictures and graphics. Format cells. Use conditional formatting on data in cells. Perform Basic Calculations – Add, Subtract, Multiply, Divide. Calculate averages, Find the maximum value. Format Worksheets – Draw tales, Format text, Format cells, Adjust columns and rows, Print worksheets. Manipulate Data - Move, copy, and paste, Add/delete columns, Add/delete rows, employ multiple worksheets, Insert/delete worksheets. Advanced Calculations – Create formulas, employ the function wizard, Add comments, Create charts.	
12.	**D**	Explain Networking Concepts. Explain Networking Infrastructure (LAN, WAN, MAN) and topologies. State the type of network used on board a ship and its limitations	
Discipline and Etiquettes- 2hrs			
13.	**E**	Demonstrate aspects of discipline and etiquettes in performance of duties, routines, given tasks. Table manners and eating etiquette.(2 hrs)	
Nautical Terms- (4hrs)			
14.	**E**	Identify various Nautical Terms , Parts of the Ship (4hrs)	

Part 2 Navigation at Support Level

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J-To be written in the Journal	Signature of the Instructor on assessment of proficiency of the trainee, and date
Practical exercise for Part 2 Navigation at Support Level Total -60 hours			
Basic Navigation and Contribution to safe watch- 20 Hrs			
1	**E**	Keep lookout duties, recognize the lights of lighthouse, buoys and ships navigation lights (identify types of navigation lights)	
2	**E**	Identify signals used for indicating distress and describe procedures to use them- ROR and other signals	
3	**E**	Take bearing of terrestrial objects using an azimuth mirror	
4	**E**	Take bearing of terrestrial objects using an azimuth mirror	
5	**E/J**	ROR- elementary stage and Bouyage	
6	**E**	Reporting and Sighting to OOW	
7	**E**	Relieving the look -out man	
8	**E/J**	Take readings of dry and wet bulb thermometer, psychrometer,	
Maintain watch and operate safety equipment- 6 hrs			
9	**E/J**	Plot position on chart, understand Modern ships bridge equipment's	
10	**E/J**	Weather and Tide data reading from the book- Basic	
11	**E/J**	Identify the MOB marker.	
12	**E/J**	Identify SART & EPIRB.	
Steer ship and Comply with orders- 20 hrs			
13	**E/J**	Identify the basic parts of a magnetic compass	
14	**E/J**	Recognize the cardinal and inter-cardinal points of a compass	
15	**E/J**	Compare Magnetic and gyro compass and apply error.	
16	**E**	Understand Helm orders and steer the ship – (Simulator)	
Mooring and Anchors -14 hrs			
~~16~~17	**E**	Make / prepare and throw the heaving line conforming to safety guidelines	
~~17~~18	**E**	Use of all types of stopper's on berthing hawser and wire as per safety guidelines	
~~18~~19	**E**	Secure mooring ropes on bollards & bits.	
~~19~~20	**E/J**	Demonstrate correct practice of heaving in or paying out a hawser on a warping drum.	
~~20~~21	**E/J**	Demonstrate correct connection of mandal and tonsberg shackle	

~~21~~22	**E**	Flaking mooring rope	
~~22~~ 23	**E/J**	Hazards involved and precautions to take whilst Passing tug rope	
~~23~~ 24	**E**	Sending Messenger rope	
~~24~~ 25	**E**	Demonstrate usage & fitting of Rat Guards.	
~~25~~ 26	**E/J**	Identify parts of an anchor and chain and their marking	
~~26~~ 27	**E**	Break open a Kenter joining shackle and again join back	

Part 3 - Cargo Handling and Stowage at Support Level

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J-To be written in the Journal	Signature of the Instructor on assessment of proficiency of the trainee, and date
Practical exercise for Part 3 Cargo Handling and Stowage at Support Level			
Cargo Handling and stowage Total -40 hrs.			
Cargo handling gear- 20 hrs			
1.	**E/J**	Identify different types of slings and their uses.	
2.	**E**	Rig the single sheave tackle complying with Safety guidelines	
3.	**E/J**	Identify and use bulldog grips, demonstrate joining of 2 wires with bulldog grips, bottle screws, and wire lashings for securing cargo,	
4.	**D**	Fix container lashings such as twist locks, bridge fitting, bars, turnbuckles, etc.	
5.	**E**	Use of pulleys and tackles Use of snatch block Use of chain hoists	
6.	**E/J**	Identify parts of a swinging derrick / boom.	
7.	**E/J**	Demonstrate lifting / moving weights of different size and shapes using a lifting gear.	
8.	**E**	Identify various tackles and purchases and their use in cargo work.	
9.	**E/J**	Procedure for safe hooking, hoisting and slewing lifting gear Safe working practices when operating Cranes and derricks	
10.	**E/J**	Identify the lifting gear and know its S.W.L.	
Handling of stores-18 hrs			
11.	**E**	Demonstrate seizing of a shackle.	
12.	**E/J**	Demonstrate lifting of bales, drums, cartons, pipes, gas bottles using the correct sling and slinging procedure • Snotter / Endless sling • Net sling / Drum clamps • Log clamps / Pallet	
13.	**E/J**	Fetch the correct size of block for a specific SWL.	
14.	**E/J**	Oil & grease the wire rope as per safety guideline.	
15.	**E/J**	Lashing carried out on: • 200 litre drums • 20 litre drums • O2, Acetylene Gas bottles • Crates	

		• Plates	
16.	**D**	Identify various types of hatch cover Rubber packing, cleats, rest pads, wedges etc	
17.	**E/J**	Valves overhaul on deck	
18.	**E/J**	Ventilators for holds, tanks maintenance	
IMDG – Code- 2 hrs			
19.	**E**	Identification of IMDG labels and Placards	

Part 4 - Marine Engineering at Support Level

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination.

Ref	Imp	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J – To be written in the Journal.	Signature of the Instructor on assessment of proficiency of the trainee, and date
Practical exercise for Part 4 Marine Engineering at Support Level Total 120 hours			
Familiarization and engine room duties – 6hrs			
1.	**E/J**	Identify personal protection gear and demonstrate their use.	
2.	**E/J**	Engine room duties and reporting to OOW	
3.	**E/J**	Engine room watch keeping procedures	
Hand tools and measuring instruments- 50 hrs			
1.	**E/J**	Identify different spanners by type and size. Use appropriate spanner as per the requirement	
2.	**E/J**	Identify different types of hammers. Use appropriate hammers in required jobs	
3.	**E/J**	Identify nuts and bolts and their usage. Identity stud and demonstrate how to fit and remove a stud	
4.	**E**	Use a joint cutter to cut joint for a pipe flange.	
5.	**E**	Make a rubber gasket to fit on a manhole	
6.	**E/J**	Identify measuring instruments and their use, Callipers, Scale, Tri-square, Divider, Vernier callipers, Inside and outside Micrometers, Feeler gauge.	
Bench vice			
1.	**E/J**	Identify a bench vice and uses of it.	
2.	**E**	Demonstrate proper and safe procedures for holding different types of job in a bench vice. (Use soft jaws for holding a delicate job to prevent damage, handling odd and heavy items, personal protection)	
Using Chisels			
1.	**E/J**	Identify different types of chisels and their uses	
2.	**E**	Use a flat chisel for chipping a mild steel block or cutting a sheet taking specific safety precautions.	
3.	**E**	Demonstrate technique of removing a rusted nut	
Using hacksaw			
1.	**E/J**	Identify different types of hacksaw frames	
2.	**E**	Fit a hacksaw blade correctly in a frame	

3.	**E**	Carry out cutting work for a given job (a plate, or a rod or a pipe)	
Filing			
1.	**E/J**	Identify different types of files and their uses	
2.	**E**	Use flat file on a plate or a mild steel block to meet the given dimension	
Marking			
1.	**E**	Identity various types of marking tools.	
2.	**E**	To carry out marking a plate or a block as per given details on a diagram.	
Tapping (for making internal threads)			
1	**E**	Identity a tap by type and size (Metric, BSW, BSP etc)	
2	**E**	Demonstrate use of a tap in sequence by making internal threads on a metal piece	
Grinding			
1.	**E/J**	Identify major components of a pedestal grinding machine	
2.	**E/J**	Identify major components of a hand grinder and how to change wheels using the appropriate tools. Know how to select the grinding wheel based on the speed of the grinding machine.	
3.	**E**	Carry out grinding operation on a given job taking specific safety precautions related to grinding.	
Drilling			
1.	**E/J**	Identify different components of a vertical drill machine.	
2.	**E**	Fit and remove a drill bit in drilling machine.	
3.	**E**	Secure the job to be drilled to a vice. It must never be held by hand.	
4.	**E**	Carry out drilling operation on a given job taking specific safety precaution related to drilling	
Lifting tools, equipment and techniques			
5.	**E/J**	Identify equipment used for lifting heavy machinery items. (eye bolts, slings, shackles, ratchet block, and chain block)	
6.	**E**	Demonstrate safe practices of using eye bolts, slings, shackles, ratchet block, and chain block for lifting and moving heavy machinery item. Understand Safe Working Load (SWL) of equipment used in lifting of loads.	
7.	**E**	Uses simple hydraulic jacks	
8.	**D**	Identify tools and jigs commonly used for lifting cylinder heads and pistons	
Auxiliary equipment and maintenance- 20 hrs			
Valves and pipe work			
1.	**E/J**	Identity different types of valves with respect to their	

		common use on board (globe, globe non return, gate/sluice, butterfly, ball, spring loaded, fire hydrant and float valve)	
2.	**E**	Demonstrate proper techniques for opening and closing each type of valve mentioned above, and how to read the indicators where fitted.	
3.	**E/J**	Identify major components of globe valve, gate valve and butterfly valve.	
4.	**E**	Demonstrate proper techniques for dismantling and assembling a globe valve	
5.	**E**	Demonstrate techniques of removing a flanged pipe from a pipeline	
6.	**E/J**	Identify various packing material and make joints/gaskets for a pipe or valve flange.	
7.	**D**	Demonstrate procedures for lapping a valve and seat of a globe valve.	
8.	**D**	Remove a packing from a valve gland and replace with new one	
Auxiliary Machinery- pumps			
9	**E/J**	Identify Types of Pumps (centrifugal, reciprocating, gear and screw type)	
10	**E**	Remove and place a pump from its foundation	
11	**D/J**	Identify the parts of a centrifugal pump	
12	**D**	Carry out checks before starting a centrifugal pump	
Auxiliary Machinery-air compressor – 2hrs			
13	**E/J**	Identify parts of a reciprocating air compressor	
14	**E**	Carry out relevant checks before starting and while it is running	
15	**E**	Demonstrate procedures for cleaning heat exchanger tubes using appropriate tube cleaning brush	
16	**E**	Uses compressed air hose for cleaning components such as filters, heat exchangers, etc.	
Diesel Engines – 4 hrs			
17	**E/J**	Identity the major components of a diesel engine. (Structure and running gear)	
18	**E**	Indicate the parts of the engine that require external cleaning, while engine is working	
19	**E**	Identify instruments such as Pressure gauges and thermometers	
20	**E**	Demonstrate ability to read pressures, ~~and~~ temperatures and lub oil level in sump, turbocharger and governor.	
21	**E**	Demonstrate techniques of cleaning of the engine parts such as pistons, ring grooves, and cylinder head during overhaul	

Cleaning agents and boiler chemicals – 2 hrs			
22	**E**	Demonstrate proper techniques for handling chemicals.	
Machines- Grinder, Drilling and Lathe- 4 hrs			
23	**E**	Introduction of the machines and safeties to be explained	
24	**E**	Positioning of work piece and identification of associated ancillary equipmet's such as drill bits, cutters	
25	**E/J**	Precautions while using portable drill machine and hand grinders	
Basics of Gas and Arc welding- 4 hrs			
26	**E**	Introduction of the machines and safeties to be explained	
27	**E/J**	Identification of associated ancillary equipment's such as gas torch, welding holder, mask, apron etc.	
28	**E**	Precautions while using gas hoses and importance of flash arrestor	
Lubricants and Lubrication- 2 hrs			
29	**E/J**	Identification and uses of various types of Lubricants used in the engine room	
30	**E**	Methods and importance of use of Lubrication on engines	
31	**E**	Understand the MSDS sheets of different types of Lubricants	
Level measuring devices and techniques- 5 hrs			
32	**E/J**	Introduction to various level measuring devices fitted on board the vessel.	
33	**E**	Basic Operation procedure for the devices	
Storage tanks- 2hrs			
34	**E/J**	Different types of storage tanks available in engine room and purpose	
35	**E**	Importance of level monitoring of the storage tank and current tank in use	
Emergencies in Engine room- 6 hrs			
36	**E/J**	Various possibilities of emergencies which can happen in an engine room	
37	**E/J**	Different types of alarm signals	
38	**E**	Importance of emergency equipment's readiness and position of portable equipment's	
39	**E**	Symbols and signage with respect to emergency equipment's and emergency escape.	
40	**E**	Understand the procedure to use EEBD and emergency escape trunk and associated equipment's such as stretcher, pulley and keeping the area clear.	
Fire extinguishing equipment's in engine room- 3 hrs			
41	**E**	Understanding the difference between portable and fixed fire-fighting equipment	

42	**E**	Basic operation of fixed fire -fighting equipment's such as CO2and Foam	
43	**E**	Understand the use of hyper mist system, emergency fire pump and sprinkler system.	
Basic Marine engineering at support level- 10 Hrs			
44	**E/J**	Understand various parts of main engine	
45	**E**	Understand the importance of use of special tools for main engine maintenance	
46	**E**	Watch keeping duties on main engine and auxiliary engine.	
47	**E**	Relevance of remote operation and quick closing valves for main and auxiliary engine	
48	**E**	Understand basic automation and relevance of internal communication on the vessel.	

Part 5 - Electrical, electronic and control engineering at Support level

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J- To be written in the Journal.	Signature of the Instructor on assessment of proficiency of the trainee, and date
Part 5 Electrical, electronic and control engineering at Support level (30 hours)			
1	**E/J**	Identify hand tools used for electric maintenance	
2	**E**	Adopt safe working practice while working with electrical appliances	
3	**E/J**	Identify the basic safety devices such as fuses and trips in electrical systems	
4	**E**	Identity different types of cables - single core, two core, three core, four core and multi-core and current ratings of cables.	
5	**E**	Use of lock-out-tag-out kit	

Part 6 - Controlling the Operation of Ship and Care for persons on board at Support Level

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J-To be written in the Journal	Signature of the Instructor on assessment of proficiency of the trainee, and date
Part 6 Controlling the Operation of Ship and care for persons on board at Support Level (118 hours)			
Rope work and Tackles- 60 hrs			
1.	**E/J**	Make a Bend, Hitch and a Knot for temporarily joining two ropes /temporary joining a rope to a structure.	
2.	**E/J**	Demonstrate tying of all essential knots and hitches(10 different knots, Reef knot, Clove hitch, Rolling hitch, half hitch, bowline, bowling on bight, fisherman's bend, sheet bend, single Carrick bend, double Carrick bend, monkey fist, timber hitch, marline spike hitch, sheep shank,	
3.	**E/J**	Measuring the diameter of the rope.	
4.	**E/J**	Identify manila, polypropylene and other synthetic ropes and the precautions to be taken in using each.	
5.	**E/J**	Carrying out various rope types of whipping	
6.	**E/J**	Carrying out various types of rope splices	
7.	**E**	Carrying out joint splice on mooring rope	
8.	**E/J**	Uncoil and Lay out a rope from a new coil	
9.	**E/J**	Care and maintenance of Natural and synthetic ropes	
10.	**E**	Seize the wire rope complying with the prescribed procedures.	
11.	**E/J**	Splice a permanent Eye on the end of a wire rope;	
12.	**E**	Join two fibre ropes by a short splice & a long splice	
13.	**D**	Spice an eye on a polypropylene mooring rope	
14.	**E**	Make a temporary eye using a bulldog grip on a wire rope.	
15.	**E**	Spice an eye on a 12mm wire rope	
16.	**E/J**	Inspection of rope for defects and criteria for rejection and replacement.	
17.	**E**	Rig and use blocks and tackle	
18.	**E/J**	Identify various types of blocks and tackle used difference between rigging to advantage and disadvantage	
19.	**E/J**	Opening and maintenance of one set of block	
20.	**E/J**	Identify and understand the use of snatch block	
21.	**E/J**	Understand the relation to sheave diameter and rope diameter.	
Contribute to the safe operation of deck equipment- 12 hrs			
22.	**E**	Identify equipment used for lifting heavy plates and spares. (eye bolts, slings, shackles, ratchet block, and chain block)	

23.	**E/J**	Demonstrate safe practices of using eye bolts, slings, shackles, ratchet block, and chain block for lifting and moving heavy deck item. Understand Safe Working Load (SWL) of equipment used in lifting of loads.	
24.	**E**	Uses simple hydraulic jacks	
25.	**D**	Identify tools commonly used for lifting oil drums	
26.	**D**	Correct operation of deck machinery, winch ,windlass, checks on header tank, engaging and disengaging clutch, application of manual brake and use of Bow stopper	
27.	**D**	Understand the importance of cooling water line for the above equipment	
28.	**D**	Understand importance of signals used on deck whilst using the above equipment	
29.	**D**	Understanding the access arrangements and hatch cover arrangement.	
30.	**E/J**	Taking tank sounding on a daily basis	
31.	**E/J**	Taking of tank ullage on a daily basis	
32.	**E/J**	Reading of draft marks, Both in meters and feet	
33.	**E**	Understand the use of mechanical apparatus for chemical spray	
34.	**E/J**	Understand the hazards while using chemicals, Read MSDS sheets	
35.	**E/J**	Use high pressure water wash machine	
Work with Bosun's chair, ladders, stages and gangway- COSWP-30 hrs			
36.	**E**	Demonstrate donning of a Safety Harness.	
37.	**E/J**	Rig Bosun's chair and lower himself using self-lowering hitch observing safety guidelines	
38.	**E/J**	Rig the stage for working and painting over-side / aloft, complying to safety guidelines	
39.	**E/J**	To assemble and use scaffolding to work at heights	
40.	**E/J**	Rig the Pilot ladder, Embark and disembark using the same observing safety guidelines	
41.	**E/J**	Rig a rope ladder for working over side, embark and disembark the ladder complying with safety guidelines	
42.	**E**	Rig and use fall arrestor device	
43.	**E/J**	Rig and climb 5m telescopic ladder complying with safety guidelines	
44.	**D**	Swing out and rig gangway / accommodation ladder	
45.	**E/J**	Rig and Use portable ladders.	
46.	**E/J**	Procedure for manual Lifting with actual weights	
47.	**E/J**	Climb the Mast with appropriate safety measures	
48.	**E/J**	Enter an enclosed space complying with safety procedures.	
49.	**E/J**	Rigging and maintaining ventilation system prior entry and during the stay inside enclosed space	
50.	**E/J**	Use gas monitor and O2 analyser to check atmosphere in the space is safe enough to enter.	

51.	**E/J**	Use of multi gas detector prior entry into enclosed space	
52.	**E/J**	Use of approved permits system for enclosed space entry	
53.	**E/J**	Moving and stowing 200 ltr drums	
54.	**E/J**	Lifting 20ltr paint drums and stowing on the rack	
55.	**E**	Lifting 25 kg bags such as cement bags etc	
56.	**E/J**	Moving O2 cylinders and acetylene cylinders to a distance using two man lift and trolley.	
57.	**E**	Lifting 15 kg carton	
58.	**E/J**	Lifting and shifting of various sizes of pipes	
Knowledge of flag work -4 hrs			
59.	**E**	Hoist and lower National flags on daily basis	
60.	**E**	Hoist signal flag for the day	
MARPOL and Prevention of Pollution – 12 hrs			
61.	**E/J**	Identify and segregate Garbage on daily basis in work area	
62.	**E/J**	Prepare garbage drums and stencil work	
63.	**E/J**	Understand connection of Bunker hose to manifold using reducer	
64.	**E/J**	Importance of closing of all deck scuppers and drain plugs in drip trays on deck	
65.	**E/J**	Identify all equipment’s in SOPEPE locker and understand the use of the items	
66.	**E/J**	Rig and use air driven pump and importance of collection of spilt oil and use of dispersants	
67.	**E/J**	Conduct of oil spill drill and related duties of each individual on board the vessel.	

Part 7 - Maintenance and Repair at Support Level

Hours against each heading are suggestive hours for each candidate to be on the job. Some of tasks may be grouped as a project, and for the sake of logistics. All practical tasks need to be completed within first 20 weeks of course to allow for revision, and schedule for practical examination

Ref.	Imp.	Task and Sub-tasks Importance (Imp.) E-Essential D-Desirable J- To be written in the Journal.	Signature of the Instructor on assessment of proficiency of the trainee, and date
Part 7 - Maintenance and Repair at Support Level (180 hours)			
Surface preparation and Painting- 50 Hrs			
1.	**E**	Chip the surface as per prescribed safety guideline	
2.	**E**	Clean the surface as per safety guidelines	
3.	**E**	Use of de scalers and wire brush machines	
4.	**D**	Use of Hydro blasters for surface preparation	
5.	**E**	Identify various surface preparation standards such as Sa and St	
6.	**E**	Demonstrate usage of a Chipping Machine, Needle gun, sanding machine and Wire brush Machine	
7.	**E/J**	Identify various types of paints which are used on board a vessel	
8.	**E**	Understand regarding, shelf life, pot life and over coat interval	
9.	**E**	Understand Measurement of wet film thickness and dry film thickness	
10.	**E**	Prepare the surface for painting	
11.	**E/J**	Identify common types of brushes and demonstrate their use	
12.	**E**	Paint the surface by using various methods – brush, roller	
13.	**E**	Paint a given surface using airless spray machine	
14.	**E**	Understand various nozzle sizes and spray guns which can be used.	
15.	**E/J**	Care and maintenance of rollers, brushes, spray hoses and nozzles	
Lubrication- 20 hrs			
16.	**E/J**	Identity various methods of lubrication ,manual and pneumatic grease guns and nipples, grease cups, oil cups, splash and forced	
17.	**E**	Ascertain level of lubricating oil using sight glass, dip stick, sounding tape, overflow pipe, sight plug in different machines and identify various types of oils in use.	
18.	**E**	Carry out lubrication /Oiling /Greasing of machinery such as diesel engines, purifiers, compressors, electric motors & pumps	

19.	**E**	Watertight doors Carried out water-tightness test Change rubber packing Lubrication and Tighten dogs	
20.	**D**	Hatch cover Identify the parts Tighten the cleats Check weather-tightness Lubrication of moving parts of the hatch cover	
21	**E**	Use hand grease gun and pneumatic grease gun to grease watertight door dogs, winch clutch, etc.	
Chemicals for cleaning- 10hrs			
22	**E/J**	Hazards associated with various on board chemicals and their use	
23	**E**	Storage procedure for Chemicals and handling procedures for chemicals	
24	**D**	Donning and importance of chemical suits	
25	**E**	Understanding the MSDS sheets of regular on board chemicals	
REPAIRS- Total 100 Hrs (Carpentry 15+ Plumbing 15+ Gas welding 10 hrs + arc welding 40 Hrs + Lathe work 20 hrs)			
Carpentry skills- 15 hrs			
	E	Identify and define the use of basic carpentry tools	
21.	**E**	Prepare a cement box	
22.	**E**	Make wooden wedges of at least three different sizes	
23.	**E**	Cut wooden blocks in 4x4 sizes for use	
24.	**E**	Tighten, fix loose legs by drilling and tightening screws	
23	**E**	Identify Jubilee Clips and demonstrate their usage.	
Gas cutting and welding practice - 10 Hrs			
33	**E/J**	Identify components of gas cut and welding equipment.	
34	**E/J**	Demonstrate safety precautions while using a gas cutting torch	
35	**E**	Carry out surface preparation prior gas welding/gas cutting jobs	
36	**E**	Demonstrate the safety precautions required while handling Oxygen / Acetylene Bottles	
37	**E**	Demonstrate process of brazing and gas cutting	
Electric arc welding practice – upto 2G skill level -40 Hrs			
38	**E/J**	Identify components of arc welding equipment used on board.	
39	**E/J**	Identify tools and apparel used for arc welding	
40	**E/J**	Idenity hazards and Demonstrate the safety precautions to be observed prior commencement and during arc welding	
41	**E**	Prepare two plates for joining by arc welding in simplest way (single butt)	
42	**E**	Carry out arc welding to join two plates (butt weld)	
Plumbing tools and practices -15 hrs			
43	**E/J**	Identity different tools and jigs for plumbing work	
44	**E**	Identity different components of pipes (elbows, unions, nipples, taps, cocks, glands, packing and joints)	

45	**E**	Demonstrate use of different plumbing tools such as wrenches, hand saw, and thread cutting. Make external threads on a pipe	
46	**E**	Demonstrate practices for joining plumbing components such as unions, bends, and nipples using sealing tapes and compounds	
47	**E**	Dismantle and assemble a cock	
48	**E**	Change tap, replace the washer of a tap	
49	**E**	Demonstrate use of a Jubilee clip or Band It clamping tool for repairing a pipe	
50	**E**	Use of sani-snake to clear blocked scuppers	
Lathe machine- 20 hrs			
51	**E/J**	Identify major parts of a lathe machine and its operating levers and switches.	
52	**E**	Demonstrate specific safety precautions while working on a lathe machine.	
53	**E**	Center a circular section MS rod in the lathe	
54	**E**	Identify use of common cutting tools and measuring instruments used in machining.	
55	**E**	Use appropriate cutting tools and face a job and take a straight cut.	

Part 11 English Communication

Hours are suggestive hours for each trainee depending on his / her level of English proficiency. Those who are weak in English communication may require more hours of practice including use of self learning exercises in English Lab. Conversely those who are relatively proficient in the use of English grammar and vocabulary may require less that the stipulated hours of learning

This is a practical training for enhancing the trainees skills in communication using English.

- Training and assessment sessions to be taken by an English faculty covering 10 Sundays x 4 hours = 40 hours

- English Lab (1 student station for every 5 trainees): Self learning using English language software in an English Lab where maritime phrases also used. This is specifically useful in developing listening and speaking skills of the trainees, using a standard English software where Marine vocabulary could be added.

- Question and Answer sessions in English where the trainee is made to listen to a paragraph and then made to reply to the question.

- Story telling

- Assessment : Standard English communication exit examination similar to IELTS. A minimum score of 4.0 to be obtained to be declared successful.

Trainees should also understand and be able to use the following English structures with reasonable accuracy:

- subject pronouns and object pronouns,
- possessives,
- the Present Simple in the positive, negative and question form (of basic, regular verbs),
- 'wh' question words,
- basic irregular verbs (be, have, do, etc.),
- modal verb can,
- word order (subject-verb-object),
- articles a/an and the,
- common nouns,
- regular, plural noun forms,
- common adjectives,
- basic conjunctions, and
- cardinal numbers.
- vocabulary
- pronounciation

Context that may be used for communication practice

- greetings and providing self introduction
- describing crew positions, practicing ordinal numbers
- talking about daily routines
- giving indication of time in 24 hour clock
- Identifying places on board and describing location
- describing onboard activities
- talking about work based planning and future work schedules
- giving approximate distances, identifying direction
- expressing agreement and understanding asking for and giving directions; finding way around the vessel
- expressing likes and dislikes ; describing leisure activities
- usage of nautical terminology and marine nomenclature related to parts of a ship and machinery
- describing anchoring, mooring operations and berthing and unberthing procedures
- describe stages in preparing for sea and for arrival in port
- describe hazards involved and safe working practices for various shipboard operations, guidance to be taken from the Code of Safe Working practices for Merchant Seafarers
- observing defects and reporting of maintenance and repairs
- use verbs to describe the movement of a vessel in a seaway
- identifying the emergency situations, recognizing emergency procedures
- understand instructions related to life saving and fire fighting and reply to instructions.
- usage of teminology for life saving and fire fighting appliances
- discuss security concerns related to ship and measures taken against threats of piracy, robbery and terrorism
- usage of phrases for telephoning and speaking on the walkie talkie
- usage of nautical terminology for cargo operations and handling of cargo lifting gear
- choosing food and drinks in the Mess room, expressing preferences and asking for food
- checking food supplies, giving details of quantities and weights, calculating prices
- comparing and contrasting sizes, speeds, age
- describing people, comparing physical appearances , describing personalities, asking for descriptive information
- identifying and describing current and future weather and sea conditions
- describing past events, incidents, injuries
- describing work carried out and tasks completed
- exchange information about leisure activities done during free time