भारत सरकार / Government of India
पोत परिवहन मंत्रालय / Ministry of Shipping
नौवहन महानिदेशालय / Directorate General of Shipping,
बिटा बिल्डिंग 9 वी मंजिल / 9th Floor, Beta Building,
आयथिंक टेक्- नो कैम्पस / I-Think Techno Campus
कांजूर मार्ग (पूर्व)/ Kanjur Marg (East)
मुंबई / Mumbai :- 400 042
फैक्स नं./ Fax No.:25752029
ईमेल्/e-mail:dgship-dgs@nic.in
टेलिफोन नं./ Tel. No.:25752040/41/42/43/44/45
वेब साईट/Web Site: www.dgshipping.gov.in

No.TR/POL/8(3)/2013 30.06.2017

NOTICE – Revised GP rating syllabus

A revised GP rating syllabus, has been prepared emphasizing more on the practical skills (hands on training) of the GP rating students. All stakeholders/concerned may kindly go through the revised syllabus and to give their valuable inputs/comments/feedback before 15th July, 2017 at dgstrg@gmail.com.

30 June 17

(Deependra Singh Bisen)
Asstt.Director General of Shipping

Training Circular XX of 2017

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 watch keeping 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 approved by DVET; 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.

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.

If any candidate fails 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 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 2 of 2007.

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
- Machining
- Electrical
- Hot Work

5. COURSE DETAILS

5.1. Duration of the course: The duration of the course shall be SIX MONTHS (Twenty-Six 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 - General Aspects **Annexure 2 A**
Part 2 - General Ship Knowledge (GSK) **Annexure 2 B**
Part 3 - Marine Engineering Knowledge & Practice (MEK) **Annexure 2 C**
Part 4 - Prevention of Pollution of the Marine Environment **Annexure 2C**
Part 5 - STCW Mandatory Courses **Annexure 2 D**
Part 6 - Assessment detailed in **Annexure 4**
Part 7 - Upkeep of the Campus **Annexure 2 D**
5.4.4. Specific Learning Objectives for Part 1 General Aspects Appendix 1A
5.4.5. Specific Learning Objectives for Part 2 GSK **Appendix 1B**
5.4.6. Specific Learning Objectives for Part 3 MEK **Appendix 1C**
5.4.7. Specific Learning Objectives for Part 4 MAR **Appendix 1C**
5.4.8. List of Practical Tasks for Part 2 – GSK **Appendix 1D**
5.4.9. List of Practical Tasks for Part 3 – MEK **Appendix 1E**

6. FACULTY REQUIREMENTS

6.1. Qualifications 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. Qualifications and experience of faculty members (academic subjects):

Academic faculty, if employed, should possess at least a Master'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 Artificiers. 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 Officer 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 of Trainers & Assessors Course for faculty members and Training of Instructors (TOI) for instructors.

6.5. Faculty Strength:

6.5.1. The number of trainees in a lecture class shall not exceed 40.

6.5.2. For practical and other work where greater inter-action is necessary, the class should be sub-divided into groups of not more than 10 trainees per instructor.

6.5.3. At least 50% of the faculty and instructors in each category must be on full-time employment 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.

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.

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

10.1. **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**

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

10.3. **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 practical) 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 The institute 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 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

The institute shall upload all data related to the course on E-Samundra within 10 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 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 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 specified authority.

Annexure 1

COURSE OUTLINE

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

Parts/Title	Theory Hrs	Practical's Hrs	Total contact	Weeks
Part 1 General Aspects Induction, personality & communication skills development, general knowledge about shipping and ships, and introduction to computers	91	64	155	
Part 2 General Ship Knowledge (Seamanship and Navigation) at Support Level	123	230	353	
Part 3 Marine Engineering Knowledge and Practice at Support Level	99	257	356	
Part 4 Prevention of Pollution of the Marine Environment	4	3	7	
Sub Total of Part 1 + Part 2 + Part 3 + Part 4	**317**	**554**	**871**	**21**
	36.4%	**63.6%**	**100%**	
Part 5 Mandatory STCW Courses and Ship Visit				
A. Proficiency in Survival Techniques (TC 31 of 2004)	10	5	15	1
B. Elementary First Aid (TC 30 of 2004)	10	5	15	
C. Fire Prevention and Fire Fighting	13	5	18	1
D. Personal Safety and Social Responsibility (STCW 2010 TC13 of 2012)	18	0	18	
E. Security Training for Seafarers with Designated Security Duties (STCW 2010 TC 27 Of 2012)	13	1	14	0.5
F. Port/Dock/Harbour/Ship Visit	01	7	08	
Total of Part 5	**65**	**23**	**88**	**2.5**
Part 6 Revision/Assessment (Internal and External)	**30**	**33**	**63**	**1.5**
Total of Part 1 to Part 6	**412**	**610**	**1022**	**25**
	40.3%	**59.7%**	**100%**	
Part 7 Holidays/passing out/etc.			**42**	**1**
GRAND TOTAL (Part 1 to Part 7)			**1064**	**26**

Annexure 2

Outline of each part of the course

Annexure 2 A

Parts/Title	T Hrs	P Hrs	Total Hrs	Wks
Part 1 – General Aspects: Induction to the course, personality and communication skills development, general knowledge about shipping and ships, and introduction to computers.	**91**	**64**	**155**	

(Please see Appendix 1A Specific Learning Objectives)

S. No.	Topics & sub topics	Theory	Practical
1.1	**English speaking, reading, writing (using topics 1.5 and 1.6 and charts and reading material)**	**35**	**30**
1.2	**Computers (Familiarization)**	**10**	**20**
1.3	**Discipline, etiquettes and Gender Sensitization**	**5**	**10**
1.4	**Health and Hygiene**	**8**	**4**
1.5	**General Aspects of Shipping** 1.5.1 Importance of Shipping in the National and International Trade 1.5.2 International Routes 1.5.3 Types of Ships and Cargoes 1.5.4 Shipboard Organization	**15**	**0**
1.6	**Nautical Terms – Parts of the Ship (Using ship models and video)** 1.6.1 Hull 1.6.2 Ships Decks 1.6.3 Fore Castle 1.6.4 Poop Deck 1.6.5 Accommodation: (Teaching Aid: Video) 1.6.6 Bridge:(Teaching Aid: Video) 1.6.7 Monkey Island 1.6.8 Cargo Spaces (Cargo Holds, Tanks) 1.6.9 Cargo Handling Gear (Derricks, Cranes, Grabs, Pumps) 1.6.10 Machinery Space (Engine Room/Pump room)	**18**	**0**

Annexure 2 B

Parts/Title	T Hrs	P Hrs	Total Hrs	Wks
Part 2 General Ship knowledge (Seamanship and Bridge duties at Support Level	**123**	**230**	**353**	

General Ship Knowledge
(Seamanship and Bridge duties at Support Level)
(Please see Appendix 1B Specific Learning Objectives)

S. No.	Topics & sub topics (indicative hours Theory + Practical)	Theory	Practical
2.1	**Basic Navigation, Operate emergency equipment & apply emergency procedures** 2.1.1 Navigation Terms 2.1.2 Rules of the Road (elementary) & Buoyage 2.1.3 Navigational aids on the Bridge of a Modern Cargo ship 2.1.4 International Code of Signal & Flags 2.1.5 Operate emergency equipment on bridge & apply emergency procedures 2.1.6 Look Out Duties: 2.1.7 Reporting to OOW on sighting 2.1.8 Reporting to OOW on hearing 2.1.9 Relieving the Look-Out Man: 2.1.10 Information required to maintain a safe watch 2.1.11 Other Bridge Duties: 2.1.12 Steer the Ship & Comply with Helm Orders in the English language: 2.1.13 Berthing, Anchoring , Mooring Systems and other Mooring Operations	**41**	**40**
2.2	**Cargo Handling and Stowage, Equipment, Maintenance & Overhaul.** 2.2.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) 2.2.2 Cargo Spaces, Opening & Closing of Hatches 2.2.3 Securing Cargoes 2.2.4 Container Cargo 2.2.5 Bulk Cargo (Other Than Grain) 2.2.6 Bulk Grain Cargo 2.2.7 Preparation of Holds and Segregation of Cargoes 2.2.8 Ventilation and Control 2.2.9 Identification of dangerous goods and precautions for their carriage 2.2.10 Oil & Chemical Cargo.	**38**	**42**
2.3	**Controlling the operation of ship and care of persons onboard** 2.3.1 Personal Protection Equipment 2.3.2 Safe working practices (General) 2.3.3 Risk Assessment (Basic)	**32**	**96**

	2.3.4 Permit to Work System 2.3.5 Work-Permits 2.3.6 Emergencies 2.3.7 Safe Access to the Ship 2.3.8 Safe Working Practices during Berthing / Unberthing, and Anchoring 2.3.9 Safety Precautions, when working aloft 2.3.10 Safety Precautions, when working over side 2.3.11 Safety Precautions during working in enclosed spaces (21 hrs P) 2.3.12 Safety Precautions, during manual lifting of weights (21 hrs P) 2.3.13 Demonstrates working knowledge of electrical safety 2.3.14 Safety precautions when climbing fixed vertical ladders and portable ladders. (21 hrs P) 2.3.15 Safety precautions when rigging scaffolding and using it 2.3.16 Safety precautions when handling chemicals and strong detergents 2.3.17 Communicate with other persons on board on elementary safety matters (1.5 hours) understand safety Information symbols, signs and alarm signals 2.3.18 Shipping Organisations (National) & documents for seafarers 2.3.19 International Organizations and Conventions 2.3.20 Seamanship, Ropes & Rope Work (5+21 Hrs P) 2.3.21 Blocks and Tackles 2.3.22 Rigging of 'Pilot ladder', 'Bosun's Chair', 'Stage', Gangway & climb a mast (11 Hrs P) 2.3.23 Duties of a Gangway Watch in Port (introduction to ISPS Code)		
2.4	**Ship Maintenance and Repair** 2.4.1 Surface Preparation and Painting 2.4.2 Lubrication	**12**	**24**
2.5	**Miscellaneous Seamanship Practical**		**28**
	Total	**123**	**230**

Annexure 2 C

Parts/Title	T Hrs	P Hrs	Total Hrs	Wks
Part 3 Marine Engineering knowledge and Practice (at Support Level	**99**	**257**	**356**	

Marine Engineering Knowledge and Practice
(Please see Appendix 1C for Specific Learning Objectives)

Marine Engineering Knowledge & Practice (at support Level)		Suggested (Hrs)	
S. No.	**Topic & Sub topics**	**Theory**	**Practical**
3.1	**Familiarization with duties and Engine Room environment** 3.1.1 Duties of a Trainee Rating in the Engine Room 3.1.2 Engine Room Space 3.1.3 Engine Room Machinery 3.1.4 Auxiliary Machinery 3.1.5 Symbols used in the engine room 3.1.6 Engine Room watch keeping procedures	**7**	**0**
3.2	Instruments (Thermometers, pressure gauges, level gauges)	**2**	**0**
3.3	Safe working procedures - lifting weights and lifting equipment, Tools, instruments & power tools. Care, maintenance and inspection for defects. 3.3.1 Hand Tools, Measuring instruments (21 hrs P) 3.3.2 Lifting devices and equipment, Basic fitting, Fasteners (21 hrs P) 3.3.3 Safety precautions while working in the engine room 3.3.4 Safety precautions during bad weather 3.3.5 Safety precautions during hot work 3.3.6 Safety precautions while working on electrical equipments 3.3.7 Safety precautions before entering enclosed spaces (21 hrs P) 3.3.8 Safety precautions during dry dock 3.3.9 Cleaning of engine room bilges, disposal of engine room waste 3.3.10 Bilge pumping system 3.3.11 Ballasting & de-ballasting system, bunkering procedures 3.3.12 Maintenance work & preservation	**12**	**63**
3.4	Auxiliary Equipment & maintenance work 3.4.1 Valves & pumps (14hrs P) 3.4.2 Pumps and Pumping Systems including ballasting & Deballasting 3.4.3 Joints and gland packing 3.4.4 Filters 3.4.5 Centrifugal separators 3.4.6 Other Auxiliaries 3.4.7 Boiler and Steam System & watch keeping duties 3.4.8 Propeller & shafting 3.4.9 Preservation of equipment in good condition	**26**	**35**

3.5	Identify components of diesel engines listed below: 3.5.1 Generator Engines 3.5.2 Main Engine	**8**	**07**
3.6	Compressed air for auxiliary purposes	**2**	**0**
3.7	Machines: Grinder, Drill, Lathe	**3**	**60**
3.8	Basic welding and cutting: Arc welding, gas welding, gas cutting	**3**	**60**
3.9	Lubricants and lubrication	**2**	**07**
3.10	Level measuring devices and techniques	**1**	**0**
3.11	Lagging and insulation	**1**	**0**
3.12	Safe use of electrical equipment 3.12.1Hand tools for Electrical Maintenance 3.12.2Electrical Components & Equipment 3.12.3Electrical Safety	**4**	**21**
3.13	Chemicals on board	**1**	**4**
3.14	Steering Gear 3.14.1Function of steering gear, check to be made while taking a round in the steering gear compartment 3.14.2Bow thruster location & importance	**3**	**0**
3.15	Storage tanks 3.15.1Types of storage tanks in the engine room 3.15.2Purpose & operation of quick closing valves	**2**	**0**
3.16	Emergencies in the engine room 3.16.1Various emergencies in the engine room 3.16.2Types of audio-visual alarms 3.16.3Action to be taken on hearing/seeing alarms 3.16.4Emergency escape routes	**4**	**0**
3.17	Fire extinguishing equipment in the engine room 3.17.1 Portable firefighting appliances in the engine room 3.17.2 Fixed firefighting equipment, i.e. CO_2, Foam, Water Sprinkler, Hyper Mist, Emergency Fire Pump	**4**	**0**
3.18	Basic Marine Engineering at Support Level 3.18.1Engineering Materials & Special Tools used for maintenance of Engine Room main & auxiliary machineries 3.18.2Watch keeping duties on main & auxiliary machineries including boilers 3.18.3Working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant 3.18.4Remote operations & internal communications system	**14**	**0**
	Total	**99**	**257**

Part 4. Prevention of Pollution of the Marine Environment
(Please see Appendix 1C for Specific Learning Objectives)

4.0	**Prevention of pollution to the Marine Environment** ➢ Sources of pollution at Sea from ship ➢ Damage to the environment ➢ Importance of prevention of pollution of the sea ➢ Ways and means of preventing pollution ➢ Pollution prevention equipment on board	**4**	**3**
	Total	**4**	**3**

Annexure 2 D

Title	T Hrs	P Hrs	Total Hrs	Wks
Part 5				
Mandatory STCW Courses and Ship Visit				
• Proficiency in Survival Techniques	**10**	**5**	**15**	**1**
• Elementary First Aid	**10**	**5**	**15**	
• Fire Prevention and Fire Fighting	**13**	**5**	**18**	**1**
• Personal Safety and Social Responsibility	**18**	**0**	**18**	
• Security Training for Seafarers with Designated Security Duties	**13**	**1**	**14**	**0.5**
• Port/Dock/Harbour/Ship Visit	**1**	**7**	**8**	
Total	**65**	**23**	**88**	**2.5**
Part 6 Assessment (Internal and External)/ revision Details in Annexure 4	**30**	**33**	**66**	**1.5**
Part 7 Holidays/passing out/etc.			**42**	

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	2
3.	White Uniform Shorts	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 Watch Keeping, 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

Annexure 4

STRUCTURE OF ASSESSMENT

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. Practical record books including ship visit reports must be sent to the authorised examination body after completion of the exit practical exam.

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	Marks	Pass Marks	Mode	Duration
1.	General Aspects & General Ship Knowledge including navigational watch- keeping and safety.	50	30	Online & Written	1 hour 45 mins
2.	Marine Engineering, Knowledge of Machinery equipment and watch keeping procedure and safety	50	30		
3.	Seamanship, watch keeping, helms skills, and safety, personal survival techniques, and protection of environment	50	30	Practical	Approx. 2 hours
4.	Work shop practice, fitting, basic welding, use of machines, safety, and firefighting techniques and first aid.	50	30		
5.	General Aspects & General Ship Knowledge including navigational watch- keeping and safety	50	30	Oral	Average duration 20 minutes

6.	Marine Engineering, Knowledge of Machinery equipment and watch keeping procedure and safety	50	30		

The external examination will be conducted during the months of July and January. Additional examination, for only repeater 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.

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 along-with 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.

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) 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.

6. Appeal for review of Answer Script:

Any candidate will be allowed to appeal a review of the answer script by a panel of **two** moderators to be appointed by the authorised examination body.

Application for appeal should be made through the training institute within 15 days from the date of results. To be addressed to the authorised examination body.

Result of the review will be declared within 15 days of the closing date of appeal. This result will be submitted to the Directorate General of Shipping (Training Branch), and institute will be informed accordingly.

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

Date, place & time of Event:

Persons involved:
Name & Roll No:
Name & 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

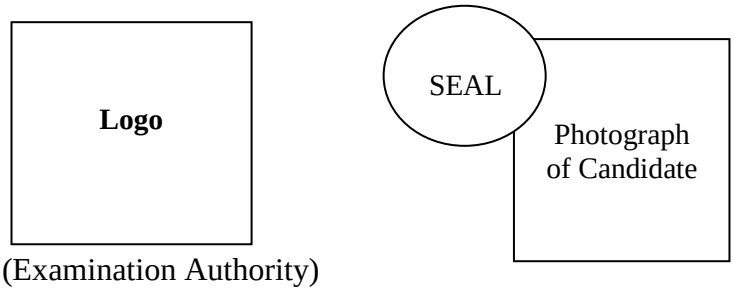
Embossed seal of Institute

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 six months 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
Above 80% marks	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

Sample of Endorsement at the back of GP Rating Certificate

The All India Exit Examination is conducted in accordance with Training Circular 13 of 2013 in compliance with regulations II/4, II/5, III/4 and III/5 of STCW'2010

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

Part 1	Induction, personality and communication skills development, general knowledge about shipping and ships, and introduction to computers
Part 2	General Ship Knowledge (Navigation, Cargo Handling and Stowage, Maintenance, Repair and Seamanship, Controlling the operation on board, Care of Persons on board – at support Level)
Part 3	Marine Engineering Knowledge and Practice, Electrical, Electronic and Control engineering (at support Level)
Part 4	Prevention of Pollution of the Marine Environment
Part 5	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 (Two) *

*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, written, practical and oral test for Parts 2 and 3. To pass the examination, a candidate must obtain a minimum of 60% marks in each component. Results are evaluated by the Directorate General of Shipping prior to issue of this certificate to successful candidates.

Annexure 8

Uniforms for faculty members

1. **Epaulettes**
   1.1. Instructor: One Stripe.
   1.2. Senior Instructor: Two stripes.
   1.3. Nautical Officer: A diamond and four stripes.
   1.4. Engineer Officer: A diamond and four stripes with purple in between.
   1.5. Senior Nautical Officer, if post exists in institute: A diamond and a broad stripe.
   1.6. Senior Engineer Officer, 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 officer 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 Officer and Senior Engineer Officer: 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**
- **Machining**
- **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)

1.	**General Equipment to include:**	**For 40**	**For 80**	**For 120**
1.1	World Maps (one in each Class Room and one in the library)	1	1	1
1.2	Minimum 3 models of Ships	1	2	3
1.3	Wall-mounted Photographs of Ships and Ports	10	10	10
1.4	Mate's Log Book	2	4	4
1.5	Official Log Book	2	4	4
1.6	Articles of Agreement	2	4	4
1.7	Muster List (one in each class room and one in the corridor)	2	4	4
1.8	Various plans of ships (GA/Fire control/LSA/Capacity/ Loadline)	1 each	1 each	2 each
1.9	Gangway register	1	2	2
1.10	Rest Hours Record	1	2	3
2.	**Video Cassettes/CD's/DVDs to include:**			
2.1	Personal Safety on Deck	1	1	1
2.2	Personal Safety in Galley	1	1	1
2.3	Personal Safety in Accommodation	1	1	1
2.4	Personal Safety in Engine room	1	1	1
2.5	Shipboard Maintenance and Painting Systems	1	1	1
2.6	Anchors and Cables	1	1	1
2.7	Safe Mooring Practice	1	1	1
2.8	Good Bunkering Practices	1	1	1
2.9	Tank Cleaning	1	1	1
2.10	Entry into enclosed spaces	1	1	1
2.11	Use of Breathing Apparatus	1	1	1
2.12	Operation and maintenance of hatch covers	1	1	1
2.13	Pollution Prevention	1	1	1
2.14	Shipboard Oil Spill Contingency Planning	1	1	1
2.15	Waste and Garbage Management	1	1	1
2.16	Bridge Watch Keeping Procedures and Routine	1	1	1
2.17	Understanding English on Board - Normal Operations	1	1	1

2.18	Understanding English on Board – Emergencies	1	1	1
2.19	Good housekeeping on deck	1	1	1
2.20	Good housekeeping in engine room	1	1	1
2.21	Good housekeeping in accommodation	1	1	1
2.22	Permit to work systems and safe working practices	1	1	1
2.23	Working Aloft and Working Overside	1	1	1
2.24	Use of Personal Protective Equipment	1	1	1
2.25	Safe Welding and Gas Cutting Practice	1	1	1
2.26	Hold Cleaning Procedure	1	1	1
2.27	Correct use of Hand Tools	1	1	1
2.28	Using Power Tools	1	1	1
2.29	Safe rigging of gangways, pilot ladders	1	1	1
2.30	Working with Lifting Gear	1	1	1
2.31	Safe Slinging	1	1	1
2.32	Hazards at Sea	1	1	1
3.	**Navigation Equipment to include:**			
3.1	Wet Card Magnetic Compass in a binnacle	1	1	1
3.2	Gyro Compass with repeaters	1	1	1
3.3	Model of Steering Wheel with Helm Indicator	1	1	2
3.4	Beaufort Scale Wind and state of Sea Chart	2	4	4
3.5	Binoculars.	2	4	4
3.6	Azimuth Circle	1	2	2
3.7	Aneroid Barometer	1	1	1
3.8	Mason's Hygrometer in a Stevenson's Screen	1	1	1
3.9	Whirling Psychrometer	1	2	2
3.10	VHF model	1	1	1
3.11	MOB Marker (dummy)	1	1	2
3.12	Navigation Lights Sentinel	1	1	1
3.13	Walkie-Talkie	2 sets	2 sets	2 sets
3.14	Steering Simulator (PC based)	1	1	1
3.15	International Code of Signals Flags (B, G, H, P, & Q)	2 sets	2 sets	2 sets
3.16	Day signals	1 set	1 set	1 set
3.17	Aldis Lamp with battery	1 set	1 set	1 set
3.18	Flag locker	1 set	1 set	1 set
4.	**Seamanship Equipment to include:**			
4.1	A ship-type mast as per DGS order no: 2 of 2007.	1	1	1
4.2	Manila Ropes [various sizes]			
4.3	Synthetic Ropes [various sizes]			
4.4	Steel wire Ropes [various sizes]			
4.5	Seizing twine and seizing wire			
4.6	Heaving Lines	4	8	8
4.7	Rope and chain stoppers	4	8	8
4.8	Anchor (Stockless) with D-shackle	1	1	1
4.9	Anchor Shackle	2	4	4
4.10	Lugless joining shackle for anchor chain	2	4	4
4.11	Mooring Shackle	2	4	4

4.12	Mooring Hawser (30 fathoms)	2	4	4
4.13	Mooring Wire (30 fathoms)	2	4	4
4.14	Bollards & Bits	2	4	4
4.15	Mooring winch with a warping drum	1	1	1
4.16	Rat guards	2	4	4
4.17	Single, double and triple sheave blocks	2 each	4 each	6 each
4.18	Cargo Block, gin block 5 ton	1	2	3
4.19	Snatch Block	1	2	3
4.20	Bottle screws and turn buckles	4	8	12
4.21	Bulldog Grips	12	24	36
4.22	Differential Pulley (chain block)	1	2	2
4.23	Container fittings including lashings	1 lot	1 lot	2 lots
4.24	Chipping hammers, scrapers and wire brushes	20 sets	40 sets	40 sets
4.25	Paint Brushes, roller brushes [various sizes and types] (1", 2", 3", 4")	12	24	36
4.26	Paint trays	12	12	12
4.27	Spray painting machine (with set of nozzles), and self-contained compressor, hose and attachment. (face mask, gloves, goggles)	1 set	2 set	2 set
4.28	Paints for practice (primer, enamel, polymer)			
4.29	Impeller (for mixing of paint)	1	1	1
4.30	Chipping machine, chipping gun with accessories with compressed air supply system	2 set	2 set	3 set
4.31	Life-jackets and life-buoys of approved type (in working condition)	12+2	12+2	24+2
4.32	Set of dummy distress signals	2	2	2
4.33	Pilot ladder rigged up for practice	1	2	2
4.34	Ropeladder rigged up for practice	1	2	2
4.35	Bosun's Chair (with self-lowering arrangement)	2	4	4
4.36	Overside Stage (with paint brush & ladder)	2	4	4
4.37	Safety Harness	4	8	12
4.38	Fall arrestor (FPD)	2	3	3
4.39	Marline Spikes	4	8	8
4.40	Wooden Spikes (fid and mallet)	4	8	8
4.41	Slings, - Snotter, net sling, endless rope sling, drum clamps, pallet	2	2	2
4.42	Sounding Rod with line	2	3	4
4.43	UTI tape	1	1	1
4.44	One ullage tape	1	1	1
4.45	Sounding tapes (Steel)	2	2	3
4.46	Fabricated manhole and its cover	2	2	2
4.47	Enclosed space (for enclosed space entry through manhole)	1	1	1
4.48	Scupper plugs	2	2	2
4.49	Coloured Garbage bins for different items as on board	1 set	2 sets	2 sets
4.50	SOPEP Locker equipment	1 set	1 set	1 set
4.51	5m telescopic ladder	1	1	2
4.52	Water finding paste	2	4	4
4.53	Hatch cover section with coaming, hatch cover and cleats	1	1	1
4.54	Mandel / Tonsberg shackle	1	1	1
4.55	Pedestal roller	1	1	1

4.56	Working life vest	1	2	2
4.57	Cargo Hold Booby hatch	1	1	1
4.58	De mucking winch	1	1	1
4.59	Gangway / accommodation ladder and Gangway net	1	1	1
4.60	Types of vents (various types)	1	1	1
4.61	Types of fenders (one each)	1	1	1
4.62	Pilot ladder Repair steps	2	4	4
4.63	Winnets for pilot ladder (chocks)	10	20	20
4.64	Paint remover	20 ltr	20 ltr	20 ltr
4.65	Stage horns and cleats	1	1	1
4.66	Turn buckle with senhouse slip	1	1	1
4.67	Jubilee clips	24	36	36
4.68	Hydraulic cutter	1	2	2
4.69	Pneumatic Needle Guns	2	2	3
4.70	Pneumatic Scrappers	2	3	3
4.71	Watertight door, with frame	1	1	1
4.72	Swing derrick / boom	1	1	1
4.73	Saws – Straight, hack and fret	4	4	4
4.74	Various Wood chisels	6	8	8
4.75	Various wood files	2	4	4
4.76	Breast braces and other clamps	4	4	4
4.77	Hand Drilling machine with hand drill bits	2	2	2
4.78	Masonry Punches	1 set	1 set	1 set
4.79	Portable electric drill and its bits including masonry bits	2	2	2
4.80	Wood screws and nails different sizes			
4.81	Jack plane	2	3	3

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.

1.	**Fitting Shop**	**For 40**	**For 80**	**For 120**
1.1	Work Bench 1200-2400-900 mm without vice	2	4	6
1.2	Work Bench 1200-2400-900 mm with four vices of two different sizes (100 mm to 150 mm wide parallel jaw)	08	08	08
2.	**Hand Tools**			
2.1	Hammers (ball pein) 150 gms, 200 gms gms	4 each	6 each	8 each
2.2	Hammer 500 gms	1	1	1
2.3	Claw Hammer 200 gms	8	8	8
2.4	Sledge Hammer 1 kg, 3 kg & 5 kg	1 each	1 each	1 each
2.5	Files flat – bastard, medium and fine cut (30 mm) (with wooden handles)	08 each	08 each	08 each
2.6	Files flat – medium and fine cut (~~20~~ 25 mm) (with wooden handles)	08 each	08 each	08 each
2.7	Files half round; triangular, square	08 each	08 each	08 each
2.8	Needle files	1 set	2 sets	3 sets
2.9	Flat Chisels 200 mm length & 150 mm length	08 each	08 each	08 each
2.10	Chisel – caulking, diamond	2 each	2 each	2 each
2.11	Spanners double open ended - 6 to 36 mm	4 sets	6 sets	8 sets
2.12	Ring Spanners - 6 to 36 mm	4 sets	6 sets	8 sets
2.13	Adjustable spanners - 200 mm & 300 mm	2 each	2 each	2 each
2.14	Box Spanners 12 points and 6 points with ratchet spanner	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
2.16	Screw drivers (various sizes) (minus and Phillips)	12	18	24
2.17	Hack Saw Frame (standard)	08	08	8
2.18	Hack Saw frame small	04	04	4
2.19	Reamers 10 mm & 12 mm	1 set	1 set	1 set
2.20	Round Hole Punch	2 sets	2 sets	2 sets
2.21	Center Punch	08	08	08
2.22	Letter Punch	2 sets	2 sets	2 sets
2.23	Thread Extractor	04	04	04
2.24	Measuring Tape	2	2	2
2.25	Crow Bar	04	4	4
2.26	Male / Female Couplings (various types) for water line and pneumatic line	1 set	1 set	1 set
2.27	Hook spanner wrench	04	04	04
2.28	Flat nose plier	04	04	04
2.29	Water pump plier	04	04	04
2.30	Tongs	08	08	08
2.31	Hand snip	04	04	04
2.32	Plastic hammer	04	04	04
2.33	Wooden mallet	08	08	08
2.34	Cloth scissor	04	04	04

2.35	Gasket and washer cutter	04	04	04
2.36	Gland packing hook	04	04	04
2.37	Steel scriber	04	04	104
2.38	Gear and wheel puller - 2 legs and 3 legs	1 each	1 each	1 each
2.39	Tube cutter	02	02	02
2.40	C - clamps	08	08	08
3.	**Instruments**			
3.1	Steel Scales - 300 mm & 1000 mm	10	10	10
3.2	Try Squares - 150 mm & 300 mm	08	8	12
3.3	Straight edge - 300 mm	2	2	3
3.4	Vernier calipers - 0 -150 mm, 0-300 mm	04 each	04 each	4 each
3.5	Micrometer (Outside) 0-25 mm, 25-50 mm, 50 -300 mm	04	4	4
3.6	Micrometer (inside) 50 – 300 mm	1	1	1
3.7	Simple calipers (inside and outside type)	08 each	8 each	08 each
3.8	Dividers	08	08	08
3.9	Die Nuts - M6 to M22	1 set	1 set	1 set
3.10	Hand Taps - M6 to M22	2 sets	2 sets	2 sets
3.11	Thread pitch gauge	2	2	2
3.12	Feeler Gauge small	2	2	2
3.13	Feeler Gauge large	2	2	2
3.14	Circlip plier - internal and external	02 each	02 each	02 each
4.	**Machines**			
4.1	Pedestal grinder or a bench grinder independently Mounted	04	04	04
4.2	Vertical Drill Machine	8	8	8
4.3	Electric Portable Drill	8	8	8
4.4	Drill bits up to 10 mm	8 set	8 sets	8 sets
4.5	Lathe complete with basic accessories (in working condition)	8	8	8
4.6	Lathe tools for turning, cutting, boring and parting	8 each	8 each	8 each
5.	**Plumbing Tools to include:**			
5.1	Grip pliers	8	8	8
5.2	Pipe Vice	8	8	8
5.3	Pipe Wrench, (large and small)	8 each	8 each	8 each
5.4	Water taps with washers,	8	8	8
5.5	Taps and dies ½ - 2 inch, for cutting threads on pipes, etc.	8 set	8 set	8 set
5.6	Unions, bends, couplings	24 pcs	36 pcs	48 pcs
5.7	Pipes for practice various lengths	20 m	30 m	40 m
5.8	Valve packing material			
5.9	Teflon thread tape			
6.	**Lubrication**			
6.1	Oiling can with a hand pump	04	04	04
6.2	Spouted oil cans three sizes	1 set	1 set	1 set
6.3	Hand Grease gun with different types of adaptors	04	04	04
6.4	Pneumatic grease gun	1	1	1

7.	**Electrical Tools to include:**			
7.1	Insulated hand tools normally used by electricians	08 each	08 each	08 each
7.2	Multimeter and megger	02 each	02 each	02 each
7.3	Fuse cartridges, and circuit breakers samples	3 each	3 each	3 each
7.4	Various types of electrical connections - samples			
7.5	Soldering irons, solder, flux.	2	2	2
7.6	Tester	08	08	08
7.7	Portable grinder (straight)	2	2	2
7.8	Portable grinder (angled)	2	2	2
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	4
8.2	Electric arc welding machine and its accessories (including personal protective gear)	8 sets	8	8
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
9.2	Centrifugal pump multi stage	1	1	1
9.3	Reciprocating Pump	1	1	1
9.4	Gear Pump	1	1	1
9.5	Vane Pump Optional	Optional		
9.6	Screw Pump	1	1	1
9.7	Hand pump (rotary)	2	2	2
9.8	Globe Valve a) Return b) Non Return	2 each	2 each	2 each
9.9	Gate/Sluice Valve	2	2	2
9.10	Butterfly Valve	2	2	2
9.11	Quick Closing Valve	2	2	2
9.12	Storm Valve	1	1	1
9.13	Safety Valve	1	1	1
9.14	Reducing Valve	1	1	1
9.15	Ball Valve	1	1	1
9.16	Float valve	1	1	1
9.17	Tapered Cock (small and medium size)	2 each	2 each	2 each
9.18	Cylindrical cock	2	2	2
10.	**Filters**			
10.1	Fuel Oil Filter (M/E) (complete) Duplex type	02	2	3
10.2	Fuel oil filter (felt type) (complete)	02	2	3
10.3	Lube Oil Filter (M/E) (duplex) (complete)	02	2	3
10.4	Lube oil filter for auxiliary engine (complete)	02	2	3
10.5	Air Filter of Turbo charger	1	2	3

11.	**Gauges**			
11.1	Level gauge for tanks	1	1	1
11.2	Pressure gauge	3	3	3
11.3	Thermometer of various sizes and range	6	6	6
11.4	Pyrometers	3	3	3
11.5	Sounding tape	2	2	2
11.6	Sounding rod	2	2	2
11.7	Boiler Gauge Glass (mounted model)	1	1	1
11.8	Boiler Gauge Glass (for practice of dismantling)	1	1	1
12.	**Diesel Engine Components**			
12.1	Fuel Injector (M/E)	1	1	1
12.2	Fuel Pump (M/E)	1	1	1
12.3	Cylinder Relief Valve (M/E)	1	1	1
12.4	Air Starting Valve (M/E)	1	1	1
12.5	Air Distributor (M/E)	1	1	1
12.6	Indicator Cock (M/E)	1	1	1
12.7	Cylinder Lubricator (M/E)	1	1	1
12.8	Cylinder Lubricator Quill (M/E)	1	1	1
12.9	Piston Rod Stuffing Box (M/E)	1	1	1
12.10	C/Case Relief Valve (M/E)	1	1	1
12.11	Scavenge Valve (M/E)	1	1	1
12.12	Cylinder Liner (Aux/E)	1	1	1
12.13	Cylinder Head (Aux/E)	1	1	1
12.14	Piston with Rings (Aux/E)	1	1	1
12.15	Connecting Rod (Aux/E)	1	1	1
12.16	Bottom End Bearing with (Aux/E) Bolts and Nuts	1	1	1
12.17	F.W/Lub. Oil Cooler	1	1	1
12.18	Aux. Air Receiver	1	1	1
13.	**Compressor, Centrifugal Separator, etc.**			
13.1	Main Air Compressor (marine type)	1	1	1
13.2	Lub. Oil/D.O/H.O. Separator	1	1	1
13.3	Boiler safety valve (complete)	1	1	1
13.4	Bilge Strum Box (complete)	1	1	1
13.5	Hydraulic Jacks, 1000 kg	1	1	1
13.6	High Pressure Washing machine for general cleaning, paint removal, descaling and hydro blasting	1	1	1
14.	**Posters for tools, instruments, engines, pumps, valves, protective gear, safety signs**	One each	One each	One each
15.	**Models**			
15.1	Boiler	**1**	1	1
16.2	Diesel Engine	**1**	1	1

Annexure 10

Additional in-house safety equipment required for IN-HOUSE PRACTICAL, 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) Thermal Protective Aids
8) Retro reflective Tapes
9) 1 Hydrostatic Release Unit (HRU)
10) Lifebuoys
11) Man Overboard Markers
12) Self-igniting Lights
13) EPIRB (Model)
14) SART (Model)
15) Neil Robertson Stretcher
16) First Aid Kit
17) Various splints & bandages
18) 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 - Training Circular XX of 2014

Appendix 1A
General Purpose Ratings
Total Duration of the Course – 26 weeks (on the basis of 42 contact hours per week)

Parts/Title	Theory Hrs	Practical's Hrs	Total Contact	Weeks
Part 1 General Aspects Induction, personality & communication skills development, general knowledge about shipping and ships, and introduction to computers	91	64	155	
Part 2 General Ship Knowledge (Seamanship and Navigation) at Support Level	123	230	353	
Part 3 Marine Engineering Knowledge and Practice at Support Level	99	257	356	
Part 4 Prevention of Pollution of the Marine Environment	4	3	7	
Sub Total of Part 1 + Part 2 + Part 3 + Part 4	**317**	**554**	**871**	**21**
	36.4%	**63.6%**	**100%**	
Part 5 Mandatory STCW Courses and Ship Visit				
A. Proficiency in Survival Techniques (TC 31 of 2004)	10	5	15	1
B. Elementary First Aid (TC 30 of 2004)	10	5	15	
C. Fire Prevention and Fire Fighting	13	5	18	1
D. Personal Safety and Social Responsibility (STCW 2010 TC13 of 2012)	18	0	18	
E. Security Training for Seafarers with Designated Security Duties (STCW 2010 TC 27 Of 2012)	13	1	14	0.5
F. Port/Dock/Harbour/Ship Visit	01	7	08	
Total of Part 5	**65**	**23**	**88**	**2.5**
Part 6 Revision/Assessment (Internal and External)	**30**	**33**	**63**	**1.5**
Total of Part 1 to Part 6	**412**	**610**	**1022**	**26**
	40.3%	**59.7%**	**100%**	
Part 7 Holidays/passing out/etc.			**42**	**1**
GRAND TOTAL (Part 1 to Part 7)			**1064**	**26**

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 1A

Title	T Hrs	P Hrs	Total Hrs	Wks
Part 1 – General Aspects: Induction to the course, personality and communication skills development, gender sensitization, general knowledge about shipping and ships, and introduction to computers.	91	64	155	

(Specific Learning Objectives)

S. No.	**Topics & sub topics**	**T**	**P**
1.1	**English speaking, reading, writing (using topics 1.5 and 1.6, charts and reading material)**	**35**	**30**
1.2	**Computers (Familiarisation)**	**10**	**20**
1.3	**Discipline, etiquettes and Gender Sensitization**	**5**	**10**
1.4	**Health and Hygiene**	**8**	**4**
1.5	**General Aspects of Shipping** Importance of Shipping in the National and International Trade International Routes Types of Ships and Cargoes Shipboard Organization	**15**	**0**
1.6	**Nautical Terms – Parts of the Ship (Using ship models)** Hull Ships Decks Fore Castle Poop Deck Accommodation Bridge Monkey Island Cargo Spaces (Cargo Holds, Tanks) Cargo Handling Gear (Derricks, Cranes, Grabs, Pumps) Machinery Space (Engine Room/Pump room)	**18**	**0**
		91	**64**

Specific Learning Objectives – General Aspects of Shipping

1.1	**English speaking, reading, writing (using topics 1.5 and 1.6 and charts and reading material)**	**35**	**30**

The trainee will be able to:

1.1.1 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 officer in a ship inspection.

1.1.2 Ability to read:
Read given handouts and instructions related to his duties on board ship.

1.1.3 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.)

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

1.1.5 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.**

1.2	**Computers (Familiarisation)**	**10**	**20**

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

Identify basic components of a PC: CPU, Monitor, keyboard, mouse, and state their purpose.
Identify keys on the keyboard and their functions: space bar, shift, return, ctrl, arrows, caps lock,
Start and log on a computer
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.
Take a simple assessment on a computer (multiple choice questions).
Using Microsoft Word, Excel, and Power Point or their equivalents.
Learn to send e-mails, Use Internet, Fill up on-line forms (e.g. Seafarers Profile on DGS Website)

1.3	**Discipline, etiquette and Gender Sensitization**	**5**	**10**

The trainee will be able to:
1. Demonstrate aspects of discipline and etiquettes in performance of duties, routines, given tasks.
2. Change behavior & instill empathy into his views about his own & the other gender.

1.4	**Health and Hygiene**	**8**	**4**

The trainee will be able to:

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

1.5	**General Aspects of Shipping** 1.5.1 Importance of Shipping in the National and International Trade 1.5.2 International Routes 1.5.3 Types of Ships and Cargoes 1.5.4 Shipboard Organization	**15**	**0**

1.5.1 Importance of Shipping in the National and International Trade

The trainee will be able to:

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

1.5.2 International Routes

The trainee will be able to:

1 Using a World Map (without labels) or Globe, name and identify location of continents, and oceans.
2 State international sea routes for ships.

1.5.3 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
- 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				

1.5.4 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 Officers and ratings
- Nautical Department consists of Master, Chief Officer, 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 Officer, Electrical Officer, Electro-Technical Rating, Electricians or Fitter and Able Seafarers (Engine), Watch-keeping engine ratings or GP ratings
- Master is overall in charge of the ship
- Catering Department includes Catering Officer, Chief Cook & General Steward (G.S.) who are responsible for cooking food for Officers and Crew and general cleanliness in accommodation.

1.6	**Nautical Terms – Parts of the Ship (Using ship models and video)** 1.6.1. Hull 1.6.2. Ships Decks 1.6.3. Fore Castle 1.6.4. Poop Deck 1.6.5. Accommodation 1.6.6. Bridge 1.6.7. Monkey Island 1.6.8. Cargo Spaces (Cargo Holds/Tanks) 1.6.9. Cargo Handling Gear (Derricks, Cranes, Grabs, Pumps etc.) 1.6.10. Machinery Space (Engine Room, Pump room etc.)	**18**	**0**

1.6 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:-

1.6.1 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,

1.6.2 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.

1.6.3 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.

1.6.4 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.

1.6.5 Accommodation

Bridge Front Bulkhead, Port holes, Alleyways, Officer'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.

1.6.6 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, SART, BNWAS, Echo sounder, course recorder, barometer, sextant, GPS. Navigation lights alarm panel, fire alarm panel.navtex. .

1.6.7 Monkey Island

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

1.6.8 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.

1.6.9 Cargo Handling Gear:

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

1.6.10 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

General Ship Knowledge (Seamanship and Bridge duties at Support Level)

Title	T Hrs	P Hrs	Total Hrs	Wks
Part 2 **General Ship Knowledge (Navigation, Cargo Handling and Stowage, Controlling the Operation of Ship and Seamanship, Repair and Maintenance duties at Support Level)**	123	230	353	

S. No.	Topics & Sub topics	T	P
2.1	**Basic Navigation, Operate emergency equipment and apply emergency procedures** 2.1.1 Navigational Terms 2.1.2 Rules of the Road (elementary) & Buoyage 2.1.3 Navigational Aids available on the Bridge of a Modern Cargo ship 2.1.4 International Code of Signal & Flags 2.1.5 Operate emergency equipment on bridge and apply emergency procedures 2.1.6 Look Out Duties: 2.1.7 The Sighting to Report will be: 2.1.8 The Hearing to Report will be: 2.1.9 Relieving the Look-Out Man: 2.1.10 Information required to maintain a safe watch 2.1.11 Other Bridge Duties: 2.1.12 Steer the Ship & Comply with Helm Orders in the English language: 2.1.13 Berthing, Anchoring, Mooring Systems and other Mooring Operations (14 P)	**41**	**40**
2.2	**Cargo Handling and Stowage** 2.2.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) 2.2.2 Cargo Spaces, Opening & Closing of Hatches 2.2.3 Securing Cargoes 2.2.4 Container Cargo 2.2.5 Bulk Cargo (Other Than Grain) 2.2.6 Bulk Grain Cargo 2.2.7 Preparation of Holds and Segregation of Cargoes 2.2.8 Ventilation and Control 2.2.9 Identification of dangerous goods and precautions for their carriage	**38**	**42**
2.3	**Controlling the operation of ship and care of persons onboard** 2.3.1 Personal Protection Equipment 2.3.2 Safe working practices (General) 2.3.3 Risk Assessment (Basic) 2.3.4 Permit to Work System 2.3.5 Work-Permits 2.3.6 Emergencies	**32**	**96**

	2.3.7 Safe Access to the Ship 2.3.8 Safe Working Practices during Berthing / Unberthing, and Anchoring 2.3.9 Safety Precautions, when working aloft 2.3.10 Safety Precautions, when working over side 2.3.11 Safety Precautions during working in enclosed spaces 2.3.12 Safety Precautions, during manual lifting of weights 2.3.13 Demonstrates working knowledge of electrical safety 2.3.14 Safety precautions when climbing fixed vertical ladders and portable ladders. 2.3.15 Safety precautions when rigging scaffolding and using it 2.3.16 Safety precautions when handling chemicals and strong detergents 2.3.17 Communicate with other persons on board on elementary safety matters (1.5 hours) understand safety Information symbols, signs and alarm signals 2.3.18 Shipping Organisation (National) & documents for seafarers 2.3.19 International Organizations and Conventions 2.3.20 Seamanship, Ropes & Rope Work (5+18) 2.3.21 Blocks and Tackles (2+10) 2.3.22 Rigging of 'Pilot ladder', 'Bosun's Chair', 'Stage', Gangway & climb a mast 2.3.23 Duties of a Gangway Watch in Port (introduction to ISPS Code)		
2.4	**Ship Maintenance and Repair** 2.4.1 Surface Preparation and Painting 2.4.2 Lubrication	**12**	**24**
2.5	**Miscellaneous**	**0**	**28**
	Total	**123**	**230**

2.1	**Basic Navigation, Operate emergency equipment and apply emergency procedures** 2.1.14 Navigational Terms 2.1.15 Rules of the Road (elementary) & Buoyage 2.1.16 Navigational Aids available on the Bridge of a Modern Cargo ship 2.1.17 International Code of Signal & Flags 2.1.18 Operate emergency equipment on bridge and apply emergency procedures 2.1.19 Look Out Duties: 2.1.20 The Sighting to Report will be: 2.1.21 The Hearing to Report will be: 2.1.22 Relieving the Look-Out Man: 2.1.23 Information required to maintain a safe watch 2.1.24 Other Bridge Duties: 2.1.25 Steer the Ship & Comply with Helm Orders in the English language: 2.1.26 Berthing, Anchoring and other Mooring Operations	**41**	**40**

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. Rules of the Road (elementary) & Buoyage

Trainee will be able to recognize navigational lights & shapes, identify buoys

2.1.3. 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.

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. 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

2.1.6. 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 Officer on duty
- Sound signals, lights and other objects are promptly detected and their approximate bearing, in degrees or points, is reported to the officer of the watch

2.1.7. 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.

2.1.8. 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

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.

2.1.9. 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 Officer
- 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 officer that you have taken charge.

2.1.10. 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

2.1.11. Other Bridge Duties:

Trainee will be able to explain the Arc of visibility and Colors of:

- Masthead Lights
- Side Light Port
- Side Light Starboard
- Stern Light
- Anchor Lights

Trainee will be able to identify various Navigational Shapes:

- Ball
- Cylinder
- Diamond
- Cone

Trainee will be able to understand orders and to communicate with the officer of the watch on matters relevant to watch keeping duties

- Communications are clear and concise and advice/clarification is sought from the officer on watch where watch information or instructions are not clearly understood.

2.1.12. Steer the Ship & Comply with Helm Orders in the English language:

Trainee will be able to State that:

- 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.
- Change over from Hand Steering to Auto Pilot and vice versa
- Applying Gyro Error

Trainee will be able to:

- 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

Trainee will be able to:

- 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'

2.1.13. Berthing, Anchoring, Mooring Systems and Mooring Operations

2.1.13.1. Berthing / Unberthing of ships

The trainee will be able to state:

- Working knowledge of the mooring system and related procedures, including the function of mooring and tug lines and how each line functions as part of an overall systems.
- Name the mooring ropes used in the forecastle as Headline, breast rope, back spring.
- Name the mooring ropes used aft as Stern-line, breast rope, back spring.
- The 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
- Knows the mooring arrangement on a ship and the sequence of using the mooring lines. Heaving mooring ropes.
- List the equipment necessary for berthing operation forward and aft as, Heaving Lines, rope stopper, chain stopper, mooring ropes and wires, windlass, mooring winch, walky-talky etc & its practical use. Throwing heaving lines, taking stopper, belaying on bits.
- State that tugs are sometimes used to assist the ship in berthing / unberthing.

- The procedures and order of events for making fast and letting go mooring and tug lines and wires, including towing lines. Passing tug rope.
- Understands that a mooring rope under tension can snapback and recoil if parted.
- Be aware of snapback zones and precautions to be taken.
- Working knowledge of the procedures and order of events associated with mooring to a buoy or buoys.
- Methods of mooring to a buoy
- Picking up a mooring hawser using messenger rope and hazards associated with them.
- Arrangements of chafe-claws, chafe gear and marker buoys.
- Flaking of mooring rope
- Use of Mandel & Tonsberg shackles.

2.1.13.2. Anchor-work

Trainee will be able to State that:

- Each vessel has two anchors in the Forecastle, one on each side.(Port & Starboard)
- The anchors pass through Hawse Pipe and are housed against the shipside
- Bow Stopper is fixed in the forecastle, close to the hawse pipe, to secure the anchor, against running out
- Anchor chain (also called cable) is connected to the anchor by joining shackle
- Anchor-chain passes over the gypsy of the windlass and goes into the chain-locker through spurling pipe
- Each length of cable is 15 fathoms or 90 feet. Identifies making on anchor cable
- The procedures and order of events for the use of anchors in various operations
- Terms used in anchoring and the reporting of the status of anchor and chain when dropped.

Cargo Handling and Stowage, Equipment, Maintenance & Overhaul.
2.2.

2.2	**Cargo Handling and Stowage, Equipment, Maintenance & Overhaul.** 2.2.10 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) 2.2.11 Cargo Spaces, Opening & Closing of Hatches 2.2.12 Securing Cargoes 2.2.13 Container Cargo 2.2.14 Bulk Cargo (Other Than Grain) 2.2.15 Bulk Grain Cargo 2.2.16 Preparation of Holds and Segregation of Cargoes 2.2.17 Ventilation and Control 2.2.18 Identification of dangerous goods and precautions for their carriage	**38**	**42**

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

Trainee will be able to state that:

- 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

2.2.2 Cargo Spaces, Opening & Closing of Hatches, Maintenance & Overhaul.

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
- Maintenance of rubber packing, cleats, rest pads, wedges, compression bar, track way, wheels etc.

2.2.3 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 officer
- methods of securing cargo faces resulting from part discharge before making a sea passage under supervision of duty officer
- methods of securing heavy loads and heavy lifts under supervision of duty officer
- methods of stowing and securing vehicles and trailers under supervision of duty officer
- 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
- lashing gear, use of bulldog gripes and turn buckles.

2.2.4 Container Cargo (2 hours)

Trainee will be able to

- describes the arrangement of a container ship and explains how the position of a particular container is designated
- understands the sequence of operations during discharging and loading at a terminal
- knows the types and sizes of container in use
- recognizes markings and labelling on containers
- knows the lifting gear used to load and unload containers
- knows the lashing gear used to lash containers

2.2.5 Bulk Cargo (Other Than Grain) (3 hours)

Trainee will be able to

- describes the preparation of cargo holds prior to loading bulk cargoes
- prepares the cargo hold under the supervision of the duty officer
- 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

2.2.6 Bulk Grain Cargo (2 hours)

Trainee will be able to

- 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)
- Use of biodegradable chemicals.
- Use of mechanical apparatus for chemical spray.
- Hazards & safeguards when using chemicals.
- Knowledge of SDS and their use.
- High pressure water wash and rinse.

2.2.7 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

2.2.8 Ventilation and Control

Trainee will be able to

- 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
- Maintenance of ventilators for holds & tanks.

2.2.9 Identification of dangerous goods and precautions for their carriage

Trainee will be able to

- 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

2.2.10 Oil & Chemical Cargo.

- Precaution for loading discharging large oil quantity & dangers involved
- Maintenance & overhaul of tank cleaning machines & Valves

2.3. Controlling the operation of ship and care of persons onboard

2.3	**Controlling the operation of ship and care of persons onboard** 2.3.24 Personal Protection Equipment 2.3.25 Safe working practices (General) 2.3.26 Risk Assessment (Basic) 2.3.27 Permit to Work System 2.3.28 Work-Permits 2.3.29 Emergencies 2.3.30 Safe Access to the Ship 2.3.31 Safe Working Practices during Berthing / Unberthing, and Anchoring 2.3.32 Safety Precautions, when working aloft 2.3.33 Safety Precautions, when working over side 2.3.34 Safety Precautions during working in enclosed spaces 2.3.35 Safety Precautions, during manual lifting of weights 2.3.36 Demonstrates working knowledge of electrical safety 2.3.37 Safety precautions when climbing fixed vertical ladders and portable ladders. 2.3.38 Safety precautions when rigging scaffolding and using it	**32**	**96**

	2.3.39 Safety precautions when handling chemicals and strong detergents 2.3.40 Communicate with other persons on board on elementary safety matters (1.5 hours) understand safety Information symbols, signs and alarm signals 2.3.41 Shipping Organisation (National) & documents for seafarers 2.3.42 International Organizations and Conventions 2.3.43 Seamanship, Ropes & Rope Work (5+18) 2.3.44 Blocks and Tackles (2+10) 2.3.45 Rigging of 'Pilot ladder', 'Bosun's Chair', 'Stage', Gangway & climb a mast 2.3.46 Duties of a Gangway Watch in Port (introduction to ISPS Code)		

2.3.1 Personal Protection Equipment

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

2.3.2 Safe working practices (general)

Trainee will be able to:

- 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

2.3.3 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.

2.3.4 Permit to Work System

Trainee will be able to:

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

2.3.5 Work-Permits

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

2.3.6 Emergencies

Trainee will be able to:

- Define an emergency
- Enumerate different types of emergencies he may encounter on a ship.
- State the emergency signal to be made to inform the ship's crew about the emergency.
- State the action to be taken by a crew member on hearing an emergency signal.
- Explain, what is 'Muster list' and what it used for?
- State that immediately after joining the ship, he will get himself familiarized with the Ship, and understand the location of LSA & FFA equipment onboard the ship, muster stations and duty.
- State that he will always follow the 'Safe Working Practices' onboard.

2.3.7 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.

2.3.8 Safe Working Practices during Berthing / Unberthing, 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

2.3.9 Safety Precautions, when working aloft

For working aloft using stage or bosun chair, the 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.

2.3.10 Safety Precautions, when working over side using stage.

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

2.3.11 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
- Identification of hazards of entering enclosed spaces, Pre-entry checks, donning equipment for entry, importance of continuing ventilation, use of gas monitors.
- 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

2.3.12 Safety Precautions, during manual lifting of weights

The Trainee shall:

- Hazards involved and safe working practices during lifting and shifting
- Estimate the weight of the package / bag / bale/oil drums / gas bottles / pipe/ sacks and dunnage.
- 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 as mentioned above.
- Keep one hand free to hold onto railing when climbing steps with weight in hand
- Use additional help for oversize and overweight packages.

2.3.13 Demonstrates working knowledge of electrical safety

- 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 Officer in Charge immediately

2.3.14 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.

2.3.15 Hazards involved and safe working practices when rigging and climbing various ladders. like vertical ladders, **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 lashed.

2.3.16 Safety precautions when handling chemicals and strong detergents

Trainee Shall:

- Be aware that chemicals and strong detergents like acid, caustic soda, bleaching powder, biodegradable chemicals and rust removers are corrosive and can burn and penetrate the skin if it comes in contact with the body. Hazards and safe guards while using chemicals.
- 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.
- Use of mechanical apparatus chemical spray, high pressure water wash and rinse.

2.3.17 Communicate with other persons on board on elementary safety matters (1.5 hours) understand safety Information symbols, signs and alarm signals

- 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

2.3.18 Shipping Organisation (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

Trainee will be able to explain the contents of '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.

2.3.19 International Organizations and Conventions

Trainee will be able to expand the following abbreviations and explain the purpose of these organizations and Conventions:

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 Officer
	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

2.3.20 Seamanship, Ropes & Rope Work

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 and uncoil a rope and wire 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 and wire 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
- Inspection of a rope for defects and criteria for rejection and replacement.
- 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.

2.3.21 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.

2.3.22 Rigging of 'Pilot ladder', 'Bosun's Chair', 'Stage', Gangway & climb a mast

Trainee will be able to rig the following with all its accessories & safety measures:

- A 'Stage' on Shipside for painting
- Self-Lowering / Hoisting 'Bosun's chair'
- Rigging of bosun's chair with gantline, double sheet bend and seizing.
- Rigging a Rope ladder
- 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
- During rigging proper PPE to be worn
- Prior usage proper inspection to be carried out.
- Hazards involved and safe working practices when rigging and climbing various ladders. like vertical ladders, companion way, accommodation ladder, gang way, Portable telescopic ladder, Pilot ladder.
-

2.3.23 Duties of a Gangway Watch in Port (introduction 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.

2.4. Ship Maintenance and Repair

2.4	**Ship Maintenance and Repair** 2.4.3 Surface Preparation and Painting 2.4.4 Lubrication	**12**	**24**

2.4.1 Surface Preparation and Painting

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.
- 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
- Knowledge of how to prepare surface to various Sa and St grades.
- 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.
- 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.
- Tools used for painting on the ship, are paint brushes, roller Brushes, and spray machines.
- Understands the importance of preparing the paint before application
- 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
- 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
- Knows that certain parts on deck may not be painted
- Paint brushes must be cleaned after every use, dried and then stored for future use.
- 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.

2.4.2 Lubrication

Select and use correct fluids, lubricants or grease (1 hour)

- Knows the ships lubrication plan
- Understand that for different machinery and equipment different types of fluids, lubricants or grease are applied
- 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

2.5 Miscellaneous Seamanship Practicals.

2.5	**Miscellaneous Seamanship Practicals**	**0**	**28**

- Taking soundings
- Taking ullage
- Fixing Scupper plugs
- Lifting and connecting bunker hose to manifold
- Lashing of drums and loose gears.
- Reading of draft marks
- Opening / closing panels
- Fixing/repairing door closure / door handles, stoppers.

Appendix 1C
Part 3 – SLOs - Marine Engineering Knowledge and Practice
(With reference to Annexure 2C)

Title	T Hrs	P Hrs	Total Hrs	Wks
Part 3 Marine Engineering Knowledge and Practice (at Support Level)	99	257	356	

Marine Engineering Knowledge and Practice

Marine Engineering Knowledge & Practice (at support Level)		**Suggested (Hrs)**	
S. No.	**Topic & sub topics**	**Theory**	**Practical**
3.1	Familiarisation with duties and Engine Room environment 3.1.1 Duties of a Trainee Rating in the Engine Room 3.1.2 Engine Room Space 3.1.3 Engine Room Machinery 3.1.4 Auxiliary Machinery 3.1.5 Symbols used in the engine room 3.1.6 Engine room watch keeping procedures	7	0
3.2	Instruments (Thermometers, pressure gauges, level gauges)	2	0
3.3	Safe working procedures – lifting weights and lifting equipments, Tools, instruments, Bilge and Ballast Pumping and Bunkering procedures 3.3.1 Hand tool, measuring instruments 3.3.2 Lifting devices and equipment, basic fittings and fasteners 3.3.3 Safety Precautions while working in the engine room 3.3.4 Safety Precautions during bad weather 3.3.5 Safety Precautions during hot work 3.3.6 Safety Precautions while working on electrical equipment 3.3.7 Safety Precautions before entering enclosed spaces 3.3.8 Safety Precautions during dry dock 3.3.9 Cleaning of engine room bilges disposal of engine room waste 3.3.10 Bilge pumping system 3.3.11 Ballasting and de-ballasting system bunkering procedures 3.3.12 Maintenance work & preservation	12	63
3.4	Auxiliary Equipment & maintenance work 3.4.1 Auxiliary equipment - general description 3.4.2 Valves 3.4.3 Pumps and Pumping Systems including ballasting and de-ballasting 3.4.4 Joints and gland packing 3.4.5 Filters 3.4.6 Centrifugal separators 3.4.7 Other Auxiliaries	26	35

	3.4.8 Boiler and Steam System and watch keeping duties 3.4.9 Propeller & Shafting 3.4.10 Preservation of equipment in good condition		
3.5	Identify components of diesel engines listed below: 3.5.1 Generator Engines 3.5.2 Main Engine	8	07
3.6	Compressed air for auxiliary purposes	2	0
3.7	Machines: Grinder, Drill, Lathe	3	60
3.8	Basic welding and cutting: Electric Arc welding, gas welding, gas cutting	3	60
3.9	Lubricants and lubrication	2	07
3.10	Level measuring devices and techniques	1	0
3.11	Lagging and insulation	1	0
3.12	Safe use of electrical equipment 3.12.1 Hand tools and electrical instruments for electrical maintenance 3.12.2 Electrical Components & Equipment 3.12.3 Electrical Safety	4	21
3.13	Chemicals on board	1	4
3.14	Steering Gear 3.14.1 Function of steering gear, Checks to be made while taking a round in the steering gear compartment 3.14.2 Bow thruster - Location and importance	3	0
3.15	Storage tanks 3.15.1 Types of Storage Tanks in the Engine Room 3.15.2 Purpose and Operation of Quick Closing Valves	2	0
3.16	Emergencies in the engine room 3.16.1 Various emergencies in the engine room 3.16.2 Types of audio-visual alarms 3.16.3 Action to be taken on hearing / seeing the alarms 3.16.4 Emergency escape routes	4	0
3.17	Fire extinguishing equipment in the engine room 3.17.1 Portable Fire Fighting Appliances in the Engine Room 3.17.2 Fixed Fire Fighting Equipment, i.e. CO_2, Foam, Water Sprinkler, Hyper Mist, Emergency Fire Pump	4	0
3.18	Basic Marine Engineering at Support Level 3.18.1 Engineering materials & Special Tools used for maintenance of Engine Room main and auxiliary Machineries 3.18.2 Watch-keeping duties on main and auxiliary Machineries, including Boilers 3.18.3 Working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant 3.18.4 Remote operations & internal communications system	14	0
	Total	99	257

Trainee will be able to: (To be used as a prefix to each of the statement of Specific Learning Objective)

3.1	**Familiarisation with duties and Engine Room environment** 3.1.1 Duties of a Trainee Rating in the Engine Room 3.1.2 Engine Room Space 3.1.3 Engine Room Machinery 3.1.4 Auxiliary Machinery 3.1.5 Symbols used in the engine room 3.1.6 Engine room watch keeping procedures	7	0

3.1.1	**Duties of a Trainee Rating: (1)** 1. States duties of a rating in the Engine room for assisting in maintenance and watch keeping 2. State the person to report to while working in the Engine room.
3.1.2	**Engine Room Space (1)** 1. Describe engine room spaces – platforms (levels) – boiler – main engine cylinder head platform – generator platform – bottom platform, funnel trunking, tank top, pipe tunnel, emergency escapes, steering flat, workshop, ventilation, and engine control room.
3.1.3	**Engine Room Machinery (1)** 1. State major items of machinery and their purpose (Main Engine, Shafting, Auxiliary Engines, Auxiliaries, Boilers,).
3.1.4	**Auxiliary Machinery (1)** 1. State function of each of auxiliary machinery (pumps, valves, fresh water generator, oil separators - purifiers, hydrophores, air compressors and their importance.
3.1.5	**Symbols used in the engine room (1)** 1. Identify different signs and symbols commonly found in the engine room (danger, no smoking, emergency escape, electrical safety, no entry).
3.1.6	**Engine room watch keeping procedures (2)** 1. To understand orders & Communicate with Officer in-charge of Engineering Watch 2. State procedures for taking over a watch, duties undertaken during watch and maintenance procedures for handover of a watch.

3.2	**Instruments (2)** 1. Identify and name instruments in the engine room: pressure gauges, thermometers, pyrometers, level gauges and units of measurements 2. Read different type of instruments in the engine room: pressure gauges, thermometers, pyrometers, level gauges.	**2**	**0**

3.3	**Safe working procedures, Tools & instruments** 3.3.1 Hand Tools & Measuring instruments (1) 3.3.2 Lifting devices and equipment, Basic fitting, Fasteners (1) 3.3.3 Safety precautions while working in engine room(1) 3.3.4 Safety precautions during bad weather(1) 3.3.5 Safety precautions during hot work(1) 3.3.6 Safety precautions while working on electrical equipments(1) 3.3.7 Safety precautions before entering enclosed space(1)	**12**	**63**

	3.3.8 Safety precautions during dry dock(1) 3.3.9 Cleaning of engine room bilges, disposal of engine room waste(1) 3.3.10 Bilge pumping system(1) 3.3.11 Ballasting & Deballasting system, Bunkering procedures(1) 3.3.12 Maintenance work & Preservation (1)		

3.3.1	**Hand Tools & Measuring Instruments** 1. 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. 2. 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. 3. Identify and name each of the measuring instruments (steel scales, inside and outside calipers, thread gauge, feeler gauge, vernier caliper, inside and outside micrometer) 4. Use the following measuring instruments properly on given tasks. (steel scales, inside and outside calipers, vernier caliper, inside and outside micrometer) 5. Inspection of tools for defect and criteria for rejection.	**1**	

3.3.2	**Lifting devices and equipment, Basic Fitting, Fasteners:** 1. Identify lifting devices and associated components (Slings, pulleys, eye bolts, shackles, pulleys, chain blocks, and engine room crane if available). 2. State checks to be made before using each of the (Slings, pulleys, eye bolts, shackles, pulleys, chain blocks, and engine room crane if available). 3. State hazards involved in moving and lifting heavy objects using slings, pulleys, eye bolts, shackles, pulleys, chain blocks, (engine room crane if available). 4. Move and shift equipment manually 5. Move and shift machinery item using lifting devices such as slings, pulleys, eye bolts, shackles, pulleys, chain blocks, (engine room crane if available). 6. Procedure for safe hooking, hoisting and slewing lifting gears. **Basic fitting:** 1. Demonstrate procedure for dismantling and assembling pipes and valves using hand tools. 2. State procedures for assembling the same. 3. State safety precautions to be taken before dismantling, while working and at the time of assembly. **Fasteners** 1. Identify and name each types of fasteners list (bolts, studs, nuts, common screw, common lock nuts and devices, and common types	**1**	

of washers) 2. Demonstrate proper methods of using fasteners and features. 3. 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. 4. State the tools that can be used to repair damaged internal or external threads.		

3.3.3 Safety Precautions while working in the engine room 1. State safety precautions while working in the engine room	**1**	

3.3.4 Safety precautions during bad weather 1. State Safety precautions during bad weather	**1**	

3.3.5 Safety precautions during hot work 1. State Safety precautions during hot work	**1**	

3.3.6 Safety precautions while working on electrical equipment 1. State Safety precautions while working on electrical equipment	**1**	

3.3.7 Safety precautions before entering enclosed space 1. State Safety precautions before entering enclosed space	**1**	

3.3.8 Safety precautions during dry dock 1. State Safety precautions in the dry dock 2. State Safety precautions during floating on completion of work in dry dock	**1**	

3.3.9 Cleaning of engine room bilges, disposal of engine room waste 1. Understand the importance of keeping the engine room floor plates clean and free of oil. 2. Know the importance of segregation of garbage and the colour coding used for garbage segregation. 3. Know the procedure to burn garbage in an incinerator. 4. Know the materials that are prohibited in an incinerator. 5. Know the dangers associated with sewage treatment plant cleaning 6. Understand the importance of segregation of oil and water in the machinery space. 7. Know the precautions in operation of an oily water separator	**1**	

3.3.10 Bilge pumping system 1. Describe bilge pumping system 2. Know that the bilge and sludge system are segregated from each other. 3. Know the areas where bilges cannot be pumped out through the OWS.	**1**	

3.3.11 Ballasting & Deballasting system & Bunkering procedures 1. Describe Ballasting & Deballasting system & Bunkering procedures	**1**	

3.3.12 Maintenance work & Preservation 1. Assist in maintenance tasks on auxiliary diesel engines, heat exchangers, pumps 2. Clean diesel engine components such as pistons, piston rings, bearings, 3. Clean components using diesel oil, chemicals. **Protection and preservation: (also in GSK)** 1. Use chipping hammers, wire brushes, and power tools in removing rust. 2. Prepare surface for painting – cleaning and degreasing. 3. Paint surfaces using paint brushes, roller 4. Identify components and function of air spray machine 5. Explain advantages of using air spray machines 6. State risks involved in using air spray machines.	1	

3.4	**Auxiliary Equipment & maintenance work** 3.4.1 Auxiliary Equipment-general description 3.4.2 Valves 3.4.3 Pumps and Pumping Systems including ballasting/deballasting 3.4.4 Joints and gland packing 3.4.5 Filters 3.4.6 Centrifugal separators 3.4.7 Other Auxiliaries 3.4.8 Boiler and Steam System including watch keeping 3.4.9 Propeller & shafting 3.4.10 Preservation of equipment in good condition	**26**	**35**

3.4.1 Auxiliary Equipment-general description 1. Identify and state function of strainers, filters, heat exchangers – coolers and heaters. 2. Name major parts of strainers, filters, heat exchangers – coolers and heaters	**2**	

3.4.2 Valves 1. 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. 2. Identify major components of each type of valve and cock. 3. State procedures for opening and closing of valves for operation (globe valves, gate valve, butterfly valve, using a wheel spanner) 4. State function of drain valves and drain cocks for air bottles, oil fuel tanks, expansion tanks and level gauges.	**4**	

3.4.3 Pumps and Pumping Systems including ballasting/deballasting 1. Identify common types of pumps in the Engine Room (centrifugal, reciprocating, gear, screw pump) 2. State the pumps that come under the category of 'positive displacement pump' and their peculiarity. 3. State precautions necessary before starting any pump 4. List major pumping systems in the engine room (Bilge, ballast, deck	**4**	

wash and fire supply, domestic fresh water, domestic sea water, expansion tanks, hot wells, compressed air system) 5. 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) 6. State observations to be made on operating pump and air compressor		

3.4.4 Joints and gland packing 1. Identify types of joints used for pipe line and equipment having water, oil, air, steam, exhaust gases, and hot water. 2. Identify type of packing material used for packing glands of valves or pumps for sea water, steam, and oil. 3. Cut rubber or of stiff material suited for round or square flanges. 4. Demonstrate procedures for cutting packing and for packing a gland. 5. State precautions to be taken before commencing repair work on a pipeline or components in situ. 6. Identify soft metal joints and 'O' rings and state care to be taken on these during maintenance 7. Carry out temporary repair to a leaky pipe using clamps or jubilee clip.	**1**	

3.4.5 Filters 1. Identifying name oil filters, and air filters used on board. 2. Identifies parts of a bucket type filter and a duplex type filter 3. States hazards involved in cleaning filters on a running machinery. 4. Know the PPE to be worn while cleaning filters. 5. Understand the importance of blowing cleaning air thru the filter opposite to the direction of medium flow. 6. Lists precautions to be taken before opening a filter for cleaning, on a stand by machine. 7. States checks to be made on a filter during cleaning and re-assembly. 8. State precautions to be taken while working on a hot filter.	**2**	

3.4.6 Centrifugal separators 1. Identify and state purpose of a centrifugal separator 2. Assist in opening up purifiers and cleaning disc stack.	**1**	

3.4.7 Other Auxiliaries 1. State functions of other auxiliaries and services such as sewage system, incinerators, refrigeration and air conditioning,	**3**	

3.4.8 Boiler and Steam System & watch keeping duties 1. State uses of steam on board. 2. 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) 3. State basic operation of boiler (fuel supply, air supply, feed water supply, water level regulators, fuel control and cut outs) 4. State observations to be made on an operating boiler	**7**	

5. State risks involved in operating an oil fired boiler 6. State the meaning of 'flash back', 'over pressure', 'low water level', 'high water level' 7. State procedures for keeping watch 8. State importance of water level in a boiler		

3.4.9 Propeller & Shafting 1. State the use of propeller & shafting	**1**	

3.4.10 Protection and preservation of equipment in good condition (also in GSK) 1. Use chipping hammers, wire brushes, and power tools in removing rust. 2. Prepare surface for painting, cleaning and degreasing. 3. Paint surfaces using paint brushes, roller 4. Identify components and function of air spray machine 5. Explains advantages of using air spray machines 6. States risks involved in using air spray machines.	**1**	

3.5	**Identify components of diesel engines listed below:** 3.5.1 Generator Engines 3.5.2 Main Engine	**8**	**07**

Identify components of diesel engines listed below: **3.5.1 Generator Engines** 1. Identify and state function of major components of an auxiliary (generator) diesel engine 2. State important systems needed for operation of an auxiliary diesel engine (Lubrication, fuel, cooling water, starting, scavenge air and exhaust, safety system, governor) 3. List safety devices on an auxiliary diesel engine 4. Describe preparation needed for starting an auxiliary diesel engine 5. State instruments fitted on an auxiliary diesel engine for monitoring its operating parameters. 6. State checks to be made on an operating auxiliary engine. **3.5.2 Main Engine:** 1. 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.) 2. State important systems necessary for operation of a Main Engine (Lubrication, fuel, cooling water, starting, air charging and exhaust, safety system)	**8**	**07**

3.6 Compressed air for auxiliary purposes 1. State different uses of compressed air for auxiliary purposes. (cleaning components and portable machines) 2. State risks involved in working with compressed air for auxiliary purposes.	**2**	**0**

3. Demonstrates use of compressed in cleaning filters and other components 4. State the arrangement provided for draining the water from the air bottle		

3.7 Machines 1. Identify and name major parts of a pedestal drill machine, and pedestal or a bench grinder: 2. Drill holes using a fixed and portable drill machine 3. Use fixed grinding machine for grinding plates, chisels, and scraper hand tools. 4. Use hand grinder for grinding plates or parts. 5. Use buffing or brush attachments for hand grinder. 6. Lathe machine: Identify parts and common tools, 7. Explain common tasks that can be performed on a lathe 8. Explain risks involved while working with power tools : Drill, Grinder and Lathe 9. Carry out basic turning and facing operation on lathe.	**3**	**60**

3.8 Basic welding and cutting: Arc welding, gas welding, gas cutting 1. State the hazards involved in using and working with welding equipment – Arc Welding and Gas cutting/welding 2. Identify components of arc welding machine used on board, personal protective equipment, tools and accessories used for welding. 3. Arc welding: Perform welding of butt joints and lap joints using arc welding machine. Demonstrate basic procedures and techniques 4. Take precautions while performing tasks 5. Brazing ferrous and non-ferrous metal plates using gas welding equipment 6. Use a gas cutting torch for cutting a plate or rusted part.	**3**	**60**

3.9 Lubricants and lubrication 1. 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) 2. States different methods of lubrication used on machinery and components 3. Identify grease nipples, greasing and oiling equipment 4. Demonstrates use of grease guns 5. Use oil can for filling in oil in crankcase of a machine 6. State precautions to be taken while working on or near an operating machinery. 7. State risks involved if oil or grease falls on hot surfaces	**2**	**07**

3.10 Level measuring devices and techniques 1. Identify and name different level measuring devices and equipment listed below: 2. Dip sticks, sounding rods, sounding tapes, gauge glass and sight glass. 3. Demonstrate use of dip sticks, sounding rods, sounding tapes, in sounding a level of liquid in a tank.	**1**	**0**

4. Read level gauges to check oil and water levels in tanks 5. State the type of fitting on a sounding pipe for a double bottom tank. 6. State the hazard of leaving the gauge in a working condition if cocks, spring loaded valves have been gagged while testing a gauge.		

3.11 Lagging and insulation 1. State purpose of lagging and insulation material on pipes and components in the engine room. 2. State importance of maintaining lagging and insulating material, and prevention of contact with oil. 3. State the common material used for lagging 4. State precaution to be taken while handling a torn lagging.	**1**	**0**

3.12	**Safe use of electrical equipment** 3.12.1 Hand tools and electrical instruments for electrical maintenance 3.12.2 Electrical Components & Equipment in ER 3.12.3 Electrical Safety	**4**	**21**

3.12.1 Hand tools and electrical instruments for electrical maintenance 1. Identify basic tools and their safety aspects 2. State precautions to be taken prior commencing work or repair of electrical equipment 3. State isolation & emergency procedures 4. State different voltages on board	**2**	**2**

3.12.2 Electrical Components and Equipment in ER 1. Electrical Equipment in ER (generators, motors, switch boards, lighting, switches, starters, starter panels 2. Identify electrical components - plugs, sockets, bulbs and tubes, cluster lights, and portable lamps 3. Carry out basic electrical maintenance: changing plugs, replacing bulbs and tubes, rigging up cluster lights and portable lamps 4. States importance of taking care of wires against chaffing	**1**	**3**

3.12.3 Electrical Safety 1. Understand and follow safety instructions of electrical equipment and machinery. 2. Recognizes and report electrical hazards and unsafe equipment. 3. Understand safe voltages for hand-held equipment. 4. Understand risks associated with high-voltage equipment and onboard work.	**1**	**1**

3.13 Chemicals on board 1. State chemicals used for different purposes on board: Air cooler and other coolers cleaners; Boiler water treatment, fuel oil treatment 2. State precautions to be taken while using and handling chemicals on board	**1**	**4**

3.14 Steering Gear 1. State function of a steering gear & its importance for trouble free operation & checks to be made while taking a round in the steering flat. 2. State functions of bow thruster, its location and importance	**3**	**0**

3.15 Storage tanks 1. 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) 2. State liquids stored in tanks: Fuel, lubricating oil, and fresh water. 3. State the purpose & operation of a 'quick closing valve'. 4. Identify a quick closing valve.	**2**	**0**

3.16 Emergencies in the engine room 1. State emergencies that can occur in the engine room (fire, flooding, black out, oil spill, injuries, electric shocks, burns,) 2. State the difference between, machinery failure alarm, general alarm, CO_2 flooding alarm). 3. State action to be taken on hearing each type of alarm 4. State that all alarms in the ER are of Audio Visual Type 5. State the importance of emergency escape routes	**4**	**0**

3.17 Fire extinguishing equipment in the engine room 1. List fire extinguishing equipment found in the engine room (Portable extinguishers, non-portable extinguishers, fire hydrants, hoses and nozzles) 2. State methods of detecting fire in the engine room (smoke type, heat type, flame type) 3. State methods of raising alarm on finding a fire in the ER. 4. State the function of fixed firefighting installation: CO_2, foam, water sprinkler, hyper mist 5. State the purpose and location of Emergency fire pump that supplies water in emergency.	**4**	**0**

3.18 Basic Marine Engineering at Support Level 1. Describe engineering materials & Special Tools used for maintenance of Engine Room main and auxiliary Machineries. 2. State Watch-keeping procedures on main and auxiliary Machineries, including Boilers. 3. Describe working of Diesel engine, air compressor, evaporator, oily bilge separator, AC & fridge plant. 4. Describe Remote operations & internal communications system.	**14**	**0**

Appendix 1C

Prevention of pollution to the Marine Environment

4.0	**Prevention of pollution to the Marine Environment** Sources of pollution at Sea from ship Damage to the environment Importance of prevention of pollution of the sea Ways and means of preventing pollution Pollution prevention equipment on board	**4**	**3**

1. State the consequences of Pollution at Sea
2. List the causes of pollution at Sea being discharge from the ships:
    a. Oil
    b. Chemical
    c. Hazardous goods
    d. Sewage
    e. Garbage including plastics
    f. Air pollutants
    g. Ballast water pollution
3. State different sources of pollutants in the engine room (oily rags, general garbage, plastics, soot and dust, oils, paints, chemicals)
4. List the precautions necessary in ships to avoid sea pollution
5. States methods of managing each of the pollutants and its disposal
6. List the steps to take for disposal of ship's garbage and plastics from the ship
7. List the precautions necessary to avoid Air pollution
8. States possibilities of fines and possibilities of arrest of an individual found to be polluting the environment deliberately
9. Explain about the 'SOPEP' Locker, and its utility
10. Understand there are strict rules for the prevention of pollution covering disposal of waste material at sea. Follow correct procedures for disposal of paint residues, solvents, sweepings and other chemicals in use
11. Safety precautions during bunkering
    - Draining any water on deck
    - Plugging of deck scuppers for bunkering purposes
    - Closing drain plugs of save all and drip trays
    - Bunker hose fitted to manifold using proper gasket and reducers and all bolts tightened
    - Opposite side bunker manifold blanked with all bolts tight
    - Drip sample bag fitted at the manifold
    - knowledge of use of emergency stop during bunkering
    - Blanks bunker hose tightly before hooking onto sling for lowered to barge in completion
12. Exchange of ballast water
    - knowledge of alien aquatic species migrating to other waters trough ballast water
    - be aware that certain alien species when introduced into another environment cause large scale destruction of local aquatic species
    - knowledge of ballast water management methods
    - knowledge of ballast water treatment
    - knowledge of sediment management
    - knowledge of ballast water sample test points

Appendix 1D

General Ship Knowledge (Seamanship and Bridge duties at Support Level)

Recommended Practical Skills (GP Rating Pre-Sea Training)

(Practical Record Book)

(With reference to Annexure 2 B)

Hours against each heading are suggestive hours for each candidate to be on the job. Total hours of work in the workshop should be about 150-165 hours. 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	Signature of the Instructor on assessment of proficiency of the trainee, and date
1. Repair and maintenance (24 hrs.)			
1.	**E**	Chip the surface as per prescribed safety guideline	
2.	**E**	Clean the surface as per safety guidelines	
3.	**E**	Prepare the surface for painting	
4.	**E**	Demonstrate usage of a Chipping Machine, Needle gun, sanding machine and Wire brush Machine	
5.	**E**	Identify common types of brushes and demonstrate their use	
6.	**D**	Paint the surface by using various methods – brush, roller, spray	
7.	**E**	Watertight doors • Carried out water-tightness test • Change rubber packing • Tighten dogs	
8.	**D**	Hatch cover • Identify the parts • Tighten the cleats • Check weather-tightness	
9.	**E**	Carpentry (21 hrs) • Identify and define the use of basic carpentry tools • Prepare a cement box, Repair / adjust door closers, stoppers, door handles, open/close panelling, • Make wedges, Cut 4 x 4 chokes. • Tighten, fix loose legs by drilling and tightening screws	
10.	**E**	Enter an enclosed space complying with safety procedures. Use gas monitor and O2 analyser to check atmosphere in the space is safe enough to enter.(21 hrs.)	
2. Work with Bosun's chair, ladders, stages and gangway (70 hrs.)			
1.	**E**	Demonstrate donning of a Safety Harness.	
2.	**E**	Rig Bosun's chair and lower himself using self-lowering hitch observing safety guidelines	

3.	**E**	Rig the stage for working and painting over-side / aloft, complying to safety guidelines	
4.	**E**	Rig the Pilot ladder, Embark and disembark using the same observing safety guidelines	
5.	**E**	Rig a rope ladder for working overside, embark and disembark the ladder complying with safety guidelines	
6.	**E**	Rig and use fall arrestor device	
7.	**E**	Rig and climb 5m telescopic ladder complying with safety guidelines	
8.	**D**	Swing out and rig gangway / accommodation ladder	
3. Rope work (21 hrs.)			
1.	**E**	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	
2.	**E**	Make a temporary eye using a bulldog grip on a wire rope.	
3.	**E**	Identify manila, polypropylene and other synthetic ropes and the precautions to be taken in using each.	
4.	**E**	Uncoil and Lay out a rope from a new coil	
5.	**E**	Secure the ends of a Rope using a Twine – Whipping	
6.	**E**	Seize the rope complying with the prescribed procedures.	
7.	**E**	Fetch equipment of various types.	
8.	**E**	Splice a permanent Eye on the end of a Fibre Rope;	
9.	**E**	Join two fibre ropes by a short splice & a long splice	
10.	**D**	Spice an eye on a polypropylene mooring rope	
11.	**E**	Spice an eye on a 12mm wire rope	
4. Mooring and Anchors (14 hrs.)			
1.	**E**	Make / prepare and throw the heaving line conforming to safety guidelines	
2.	**E**	Put a double stopper on berthing hawser and wire as per safety guidelines	
3.	**E**	Secure mooring ropes on bollards & bits.	
4.	**E**	Demonstrate correct practice of heaving in or paying out a hawser on a warping drum.	
5.	**E**	Demonstrate usage & fitting of Rat Guards.	
6.	**E**	Identify parts of an anchor and chain and their marking	
7.	**E**	Break open a kenter joining shackle and again join back	
5. Cargo Handling and stowage (20 hrs.)			
1.	**E**	Identify different types of slings and their uses.	
2.	**E**	Rig the single sheave tackle complying with Safety guidelines	
3.	**E**	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 twistlocks, bridge fitting, bars, turnbuckles, etc.	
5.	**E**	Identify parts of a swinging derrick / boom.	
6.	**E**	Demonstrate lifting / moving weights of different size and shapes using a lifting gear. (21 hrs)	
7.	**E**	Identify various tackles and purchases and their use in cargo work.	
8.	**E**	Identify the lifting gear and know its S.W.L.	
9.	**E**	Demonstrate seizing of a shackle.	
10.	**E**	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	
11.	**E**	Fetch the correct size of block for a specific SWL.	
12.	**E**	Oil & grease the wire rope as per safety guideline.	
13.	**E**	Use hand grease gun and pneumatic grease gun to grease watertight door dogs, winch clutch, etc.	
14.	**D**	Identify various cargo gears used on board and related safe working practices.	
15.	**E**	Lashing carried out on: • 200 litre drums • 20 litre drums • O2, Acetylene Gas bottles • Crates • Plates	
6. Navigational Watch (12 hrs)			
1.	**E**	Keep lookout duties, recognize and report the lights of lighthouse, buoys and ships navigation lights (identify types of navigation lights)	Orals
2.	**E**	Identify signals used for indicating distress and describe procedures to use them	
3.	**E**	Identify the basic parts of a magnetic compass	
4.	**E**	Recognize the cardinal and inter-cardinal points of a compass	
5.	**E**	Compare Magnetic and gyro compass and apply error.	
6.	**E**	Take bearing of terrestrial objects using an azimuth mirror	
7.	**E**	Understand Helm orders and steer the ship	
8.	**E**	Take readings of dry and wet bulb thermometer, psychrometer, hydrometer	
9.	**E**	Bend flags on the halyards for single letter signal (Five flags).	

10.	**E**	Identify type of ship by their navigation lights and what they are doing	
7. Miscellaneous (35 hrs)			
1.	**E**	Climb the Mast with appropriate safety measures	
2.	**E**	Use sounding tape, sounding rod and ullage tape and take readings	
3.	**E**	Demonstrate usage of Staghorns and Cleats.	
4.	**E**	Identify the MOB marker, SART & EPIRB.	
5.	**E**	Blocking of scuppers, hose connection, lifting and lashing drums, reading drafts	
6.	**E**	Identify Jubilee Clips and demonstrate their usage.	
7.	**E**	Manual handling of weights • Moving and stowing 200 ltr drums • Lifting 20ltr paint drums and stowing on the rack • Lifting 25 kg bags • Moving O2 cylinders • Lifting 15 kg carton	
8. Port / Dock / Harbour / Ship Visit (8 hrs)			
1.	**E**	Write a brief report for one of the visits (List equipment and parts seen with date of visit, ships name, type of ship, port, etc.	
9. MARPOL and Prevention of Pollution (1 hr)			
1.	**E**	Identify different coloured Garbage Bins and indicate correct procedures for disposal of garbage.	
2.	**E**	Demonstrate usage of Scupper plugs.	
3.	**E**	SOPEP Oil Pollution Kit - identify the different equipment	

	Additional assignments:	
1.		
2.		
3.		
4.		

Appendix 1E
Recommended Practical Skills (GP Rating Pre-Sea Training)
(Practical Record Book)

Marine Engineering at Support Level
Hours against each heading are suggestive hours for each candidate to be on the job. Total hours of work in the workshop should be 240-260 hours. 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	Signature of the Instructor on assessment of proficiency of the trainee, and date
1.	**E**	Identify personal protection gear and demonstrate their use. **(2 hrs.)**	
1. Hand tools and measuring instruments (10hrs.)			
1.	**E**	Identify different spanners by type and size. Use appropriate spanner as per the requirement	
2.	**E**	Identify different types of hammers. Use appropriate hammers in required jobs	
3.	**E**	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**	Identify measuring instruments and their use, Callipers, Scale, Tri-square, Divider, Vernier callipers, Inside and outside Micrometers, Feeler gauge.	
7.	**E**	Inspects the tools to for defects and replace	
2. Bench vice (02 hrs.)			
1.	**E**	~~Identities~~ 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)	
3. Using Chisels (02 hrs.)			
1.	**E**	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	

4. Using hacksaw (04hrs.)			
1.	**E**	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)	
5. Filing (8 hrs.)			
1.	**E**	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	
6. Marking (01 hrs.)			
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.	
7. Grinding (07 hrs.)			
1.	**E**	Identify major components of a pedestal grinding machine	
2.	**E**	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.	
8. Drilling (07 hrs.)			
1.	**E**	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	
9. Tapping (for making internal threads) (01 hrs.)			
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	
10. Valves and pipe work (14 hrs.)			
1.	**E**	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**	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**	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	
11. Auxiliary Machinery- pumps (7 hrs.)			
1.	**E**	Identify Types of Pumps (centrifugal, reciprocating, gear and screw type)	
2.	**E**	Remove and place a pump from its foundation	
3.	**D**	Identify the parts of a centrifugal pump	
4.	**D**	Carry out checks before starting a centrifugal pump	
12. Auxiliary Machinery-air compressor (03 hrs.)			
1.	**E**	Identify parts of a reciprocating air compressor	
2.	**E**	Carry out relevant checks before starting and while it is running	
3.	**E**	Demonstrate procedures for cleaning heat exchanger tubes using appropriate tube cleaning brush	
4.	**E**	Uses compressed air hose for cleaning components such as filters, heat exchangers, etc.	
13. Lifting tools, equipment and techniques (21 hrs.)			
1.	**E**	Identify equipment used for lifting heavy machinery items. (eye bolts, slings, shackles, ratchet block, and chain block)	
2.	**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.	
3.	**E**	Uses simple hydraulic jacks	
4.	**D**	Identify tools and jigs commonly used for lifting cylinder heads and pistons	
5	**D**	**Demonstrates the use of chain block for lifting heavy items.**	
14. Diesel Engines (10 hrs.)			
1.	**E**	Identity the major components of a diesel engine. (Structure and running gear)	
2.	**E**	Indicate the parts of the engine that require external cleaning, while engine is working	
3.	**E**	Identify instruments such as Pressure gauges and thermometers	

4.	**E**	Demonstrate ability to read pressures, ~~and~~ temperatures and lub oil level in sump, turbocharger and governor.	
5.	**E**	Demonstrate techniques of cleaning of the engine parts such as pistons, ring grooves, and cylinder head during overhaul	
15. Lubrication (07 hrs.)			
1.	**E**	Identity various methods of lubrication (grease guns and nipples, grease cups, oil cups, splash and forced)	
2.	**E**	Ascertain level of lubricating oil using sight glass, dip stick, sounding tape, overflow pipe, sight plug in different machines	
3.	**E**	Carry out lubrication /Oiling /Greasing of machinery such as diesel engines, purifiers, compressors, electric motors & pumps	
4.	**D**	**Demonstrates the use of pneumatic grease gun**	
5.	**D**	**Differentiates between lubricating oil, grease and coolant.**	
16. Plumbing tools and practices (21 hrs.)			
1.	**E**	Identity different tools and jigs for plumbing work	
2.	**E**	Identity different components of pipes (elbows, unions, nipples, taps, cocks, glands, packing and joints)	
3.	**E**	Demonstrate use of different plumbing tools such as wrenches, hand saw, and thread cutting. Make external threads on a pipe	
4.	**E**	Demonstrate practices for joining plumbing components such as unions, bends, and nipples using sealing tapes and compounds	
5.	**E**	Dismantle and assemble a cock	
6.	**E**	Change tap, replace the washer of a tap	
7.	**E**	Demonstrate use of a Jubilee clip or Band It clamping tool for repairing a pipe	
8.	**E**	Use of sani-snake to clear blocked scuppers	
9.	**D**	**Demonstrates to carry out maintenance of flush valves**	
10.	**D**	**Demonstrates the ability to carry out repair of flush tank and replace the rubber washers.**	
11.	**D**	**Make required size of clip to stop leakages from cracked pipes by using rubber bands.**	
12	**E**	**Demonstrates the use of M seal, Aeraldite anabond and other adhesives**	
17. Gas cutting and welding kits and welding methods /procedures (21 hrs.)			
1.	**E**	Identify components of gas cut and welding equipment.	
2.	**E**	Demonstrate safety precautions while using a gas cutting torch	
3.	**E**	Carry out surface preparation prior gas welding/gas cutting jobs	
4.	**E**	Demonstrate the safety precautions required while handling Oxygen / Acetylene Bottles	
5.	**D**	Demonstrate process of brazing and gas cutting	
18. Electric Arc welding kit and welding methods /procedures (12hrs.)			
1.	**E**	Identify components of arc welding equipment used on board.	

2.	**E**	Identify tools and apparel used for arc welding	
3.	**E**	Demonstrate the safety precautions to be observe prior commencement of arc welding	
19. Arc welding practice (30 hrs.)			
1.	**E**	Prepare two plates for joining by arc welding in simplest way (single butt)	
2.	**E**	Carry out arc welding to join two plates (butt weld)	
20. Hand tools and safe working practices electrical shop (14 hrs.)			
1.	**E**	Identify hand tools used for electric maintenance	
2.	**E**	Adopt safe working practice while working with electrical appliances	
3.	**E**	Identify the basic safety devices such as fuses and trips in electrical systems	
4.	**E**	**Demonstrates the use of multi-meter and megger**	
5.	**E**	**Demonstrates the ability to read voltmeter, ampere meter and watt meter**	
6.	**E**	**Demonstrates the ability to carry out batter maintenance**	
7.	**E**	**Demonstrates the ability to make a parallel circuit by using electrical accessories(Switch board assembly) .**	
8.		**Demonstrates the ability to carry out batter maintenance**	
9.		**Demonstrates the ability to make a series circuit by assembling a tube light.**	
21. Electric cable and wires (07 hrs.)			
1.	**D**	Identity different types of cables - single core, two core, three core, four core and multi-core and current ratings of cables.	
2.	**D**	**Demonstartes the construction of cables and its color codes.**	
22. Cleaning agents and boiler chemicals (4 hrs.)			
1.	**E**	Demonstrate proper techniques for handling chemicals.	
23. Lathe Machine (42 hrs.)			
1.	**E**	Identify major parts of a lathe machine and its operating levers and switches.	
2.	**E**	Demonstrate specific safety precautions while working on a lathe machine.	
3.	**E**	Centre a circular section MS rod in the lathe	
4.	**E**	Identify use of common cutting tools and measuring instruments used in machining.	
5.	**E**	Use appropriate cutting tools and face a job and take a straight cut.	
24. MARPOL and Prevention of Pollution (2 hrs.)			

1.	**D**	Connect bunker hose to manifold using a reducer. Close drain plug of drip tray.	
2.	**D**	Identifies SOPEP equipments	
3.	**D**	Demonstrates the use of scupper plugs	

	Additional Tasks, if any	
1.		
2.		
3.		
4.		