



भारत सरकार / GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
MINISTRY OF PORTS, SHIPPING AND WATERWAYS
नौवहन महानिदेशालय, मुंबई
DIRECTORATE GENERAL OF SHIPPING, MUMBAI

File No. 13-39/4/2021-ENGG – DGS (C.N.9713)

Date : 20.06.2022

DGS Order No. 17 of 2022

Subject : STCW Certification of Indian Navy Personnel in accordance with Article IX of the Convention

1. The STCW Convention was adopted at International Maritime Organization on 7th July 1978 and entered into force on 28 April 1984. There are at present 166 signatories to the Convention, the combined merchant fleets of which constitute approximately 99.03% of the gross tonnage of the world's merchant fleet.
2. The 1978 STCW Convention was the first to establish basic requirements or training, certification and watch-keeping for seafarers on an International level. Prior to entry into force of the Convention the standards of training, certification and watch-keeping of officers were established by individual governments, usually without reference to practices in other countries.
3. India was also issuing Certificate of Service to the Indian Navy personnel who had attained the ranks of Lieutenant in the Executive Branch or has attained the rank of Lieutenant or Sub-Lieutenant in the engineering branch in accordance with Section 80 of the Merchant Shipping Act, 1958.
4. The entry into force of the STCW Convention on 28 April 1984, brought uniformity in the Certification regime by prescribing minimum standards relating to training, certification and watch-keeping for seafarers which countries are obliged to meet or exceed. Article VII of the Convention permitted issuance of Certificate of Service by member state to the Convention in accordance with its previous practice only for a maximum period of 2-Years after entry into force of the Convention for that state (2-Months after ratification, acceptance, approval or accession deposited by that state).
5. India acceded to the Convention on 16 November 1984 and it entered into force on 16 February 1985 and Section 80 of Merchant Shipping Act, 1958 was repealed on 14 August 1986.
6. Article IX of the Convention permits issuance of Certificate of Competence and Certificate of Proficiency to Naval personnel provided equivalents are established

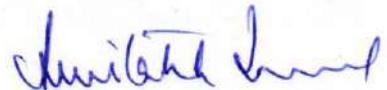
9वीं मंजिल, बीटा बिल्डिंग, आई थिंक टेक्नो कैम्पस, कांजुर गाँव रोड, कांजुरमार्ग (पूर्व) मुंबई- 400042

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with regards to the level of seagoing service, knowledge and efficiency as regards navigational and technical handling of ship and cargo, which ensures a degree of safety at sea and has a preventive effect as regards pollution at least equivalent to the requirements of the Convention.

7. The Directorate has last established equivalence in 2004-2006 and issued following Notices/Circulars/Orders etc. in order to facilitate transition of Naval Personnel to Merchant Navy:
 - (i) MS Notice 06 of 2004 Conversion of Certificate of Service as (Master (FG) to appropriate certificate of competency as Chief Mate (FG) or 2nd Mate (FG) under STCW'95.
 - (ii) MS Notice 10 of 2004: Examination system for serving Naval Officers to obtain Certificate of Competency (Limited) issued under Regulation II / 1 of STCW'78 as amended.
 - (iii) MS Notice 10 of 2006: Procedure for obtaining Certificate of Competency at the Operational Level and Management Level for ships of less than 3,000 Gross Tonnage operating in near Coastal voyages - valid for areas encompassed between the ports of Bangladesh, India, Maldives, Myanmar and Sri Lanka only and ships of less than 3,000 Gross Tonnage operating Worldwide for officers of Indian Navy or Indian Coast Guard Officers in possession of "Full Naval Watch-keeping Certificate.
 - (iv) Flow Diagram III/1 of TEAP A for Issuance of Class IV (FG) CoC under Regulation III/1 of the STCW Convention to Indian Navy Engineer Officers.
 - (v) Flow Diagram III/11-2, III/11-3 & III/11-4 of TEAP A for Issuance of Class IV (NCV) on ships with less than 3000 KW Propulsion power to Indian Navy sailors.
8. With more than 15-years since the last equivalence being assessed and also the entry into force of the 2010 amendments to STCW Convention, a joint exercise has been conducted again between Indian Navy and DGS Officials to assess in details the education, training and sea service performed by Indian Navy personnel with the requirements of STCW Convention to identify the gaps and devise methodologies to bridge the gap.
9. The devised transition schemes are attached to this Order as Part "A" for Engineering Stream and Part "B" for Nautical Stream. A dedicated on-line system shall be developed to facilitate the application, assessment and issuance of CoC/CoP to Indian Navy personnel with following stages:
 - Stage 1:** Indian Navy to apply for and get INDOS Number and CDC.
 - Stage 2:** Issuance of Basic and Advanced Safety Course by Directorate based on Certification by Indian Navy for completion of relevant competencies or Indian Navy



personnel may complete the course at an approved MTI for issuance of relevant CoP as per normal procedures.

Stage 3: Uploading of Indian Navy certification by Indian Navy personnel for completion of education and training, bridge sea courses, approved seagoing service for assessment of eligibility for a particular grade of examination & issuance of CoP.

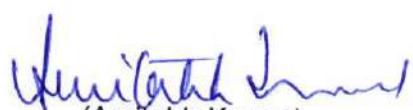
Stage 4: Apply for written and oral exam; appear and pass and apply for CoC and issuance of CoC.

10. Many of the following basic and advanced courses are being conducted by Indian Navy with different names:

- Personal Survival Techniques Course
- Fire Prevention and Fire Fighting Course
- Elementary First Aid Course
- Personal Safety and Social Responsibilities Course.
- Advanced Fire Fighting Course
- Proficiency in Survival Craft and Rescue Boats Course (Other than Fast Rescue Boats).
- Medical First Aid Course.
- Course for Seafarers with Designated Security Duties.
- Ship Security Officer Course

11. In case the competencies detailed in above courses are covered while training for various courses, the Indian Navy to certify the same in accordance with the attached **Annexure 1** "Certificate of Completion of Training in Basic and Advanced Safety and Modular Course Certificate" for issuance of relevant CoP through on-line system to be developed by the Directorate. If same is not the case, the course is to be completed by the personnel at approved MTI and MTI shall issue relevant digitized CoP after satisfactory completion of Three Tier Training.

12. This Order comes into effect from date of issue.



(Amitabh Kumar)
Director General of Shipping &
Additional Secretary to the Govt. of India

Part A of DGS Order 17 of 2022

**Transition Scheme (STCW Certification) for Indian Navy Engineering Branch
Personnel to Merchant Navy In Accordance with Article IX of the STCW Convention**

A. Background to Assessment of Equivalence Compliance with STCW Convention under Article IX of the Convention

1. The Directorate along with Indian Navy has now conducted a detailed & in-depth assessment of educational, training and sea service experience gained by Indian Navy personnel to identify gaps in educational, training and sea service for issuance of CoC and CoPs under relevant regulations of the STCW Convention.
2. The gaps have been identified for various categories/hierarchal levels of Indian Navy personnel on the basis of their basic educational qualification, training & education while in service and the relevant experience completed on sea-going Naval ships and having attained required competencies detailed in the STCW Code:
 - (i) **B-Tech in Marine or Mechanical Engineering** working as Engineer Officers at various hierarchical levels on Indian Navy Ships and carrying out independent watch-keeping for issuance of Class IV(FG), Class II(FG) & Class I (FG) CoC under Regulation III/1 & III/2 of the STCW Convention.
 - (ii) **Diploma in Mechanical Engineering/CHERA Course Qualified Personnel** working as Mechanical (Engine Room) Artificers on Naval Ships for issuance of relevant Class IV-NCV, Class III-SEO-NCV & Class III-CEO-NCV (on ships of propulsion power less than 3000 KW) CoC under Regulation III/1 & III/3 of the STCW Convention.
 - (iii) **B-Tech in Electrical/Electronic Engineering** and working as Electrical Engineers on Indian Navy Ships for issuance of Electro Technical Officer CoC under Regulation III/6 of the STCW Convention.
 - (iv) **Diploma in Radio/Power Engineering or CHEA Course Qualified Personal and working as Electrical Artificers** on Indian Navy ships for issuance of Electro-Technical Officer CoC under Regulation III/6 of the STCW Convention.
 - (v) **Mechanical Rating** on Indian Navy Ships for issuance of CoP under Regulation III/4 & III/5 of the STCW Convention.
 - (vi) **Electrical Ratings** on Indian Navy Ships for issuance of CoP under Regulation III/7 of the STCW Convention.
3. The following educational and training courses completed at Indian Navy by **B-Tech in Marine/Mechanical Engineers** have been compared with IMO Model Course 7.04 (Officer In-charge of an Engineering Watch) & Model Course 7.02 (Chief Engineer Officer and Second Engineer Officer):

- (i) Marine Engineering Specialized Course Phase I, II & III.
 - (ii) Marine Propulsion Control Technology Course.
 - (iii) Fire-fighting and damage control course.
 - (iv) Engineer Officer Technical Management Course.
 - (v) Engineer Officer Information Technology and NBCD Concepts.
 - (vi) Fire Fighting and Fire Prevention Course.
- 3.1. **The Indian Navy will be required to certify** that the person has completed and passed all the above courses. The following Bridge Courses have been designed based on above gap assessment:
- (i) **Bridge Course 1:** For fulfilling gaps in education and training for Class IV FG CoC under Regulation III/1.
 - (ii) **Bridge Course 2:** For fulfilling gaps in education and training for Class II FG CoC under Regulation III/2.
 - (iii) **Bridge Course 3:** Engineering Management Course as per Training Circular 08 of 2012 under Regulation III/2.
4. The following educational and training courses completed in Indian Navy by **Mechanical Artificers/Diploma in Marine/Mechanical Engineers** have been assessed against "Specification of Minimum Standard of Competence for Officer In Charge of an Engineering Watch of Ships operating in Near Coastal Voyages MEO CLASS IV (NCV)" & "Part B of the Detailed Syllabus & Papers under Which Function of Marine Engineering at the Management Level for MEO Class III-SEO limited to 3000 KW" given in Appendix- III/5A of the Training, Examination & Assessment Programme (TEAP) Part B:
- (i) Merged Artificer Apprentice course (MAAC) divided into four terms A, B, C and D.
 - (ii) Chief Artificer Qualification Course.
 - (iii) Class of Ship training PCT Course.
 - (iv) Fire-fighting and damage control course
- 4.1. The following Bridge Courses have been designed based on above gap assessment:
- (i) **Bridge Course 4:** For fulfilling gaps in education and training for Class IV-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/1.
 - (ii) **Bridge Course 5:** For fulfilling gaps in education and training for Class III-SEO-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/3.



- (iii) **Bridge Course 6:** Engineering Management Course as per Training Circular 25 of 2012 for Class III-CEO-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/3.
5. The following educational and training courses completed in Indian Navy by **B-Tech in Electrical/Electronic Engineering** have been assessed with IMO Model Course 7.08 (Electro Technical Officer):
- (i) Electrical Specialization Course Phase I, II & III.
 - (ii) Leadership and Management Course.
 - (iii) Financial & Inventory Management Course.
 - (iv) Advanced Technology Course.
 - (v) Competence Course.
 - (vi) Fire-fighting and damage control course
- 5.1. The following Bridge Courses have been designed based on above gap assessment:
- (i) **Bridge Course 7:** For fulfilling gaps in education and training of Indian Navy B-Tech Electrical/Electronic Engineers for Electro-Technical Officer CoC under Regulation III/6. They will also be required to complete High Voltage Safety and Switch Gear Course.
6. The Indian Navy Electrical Artificers who have/get (while in Indian Navy)Diploma in Radio/Power will have to complete following bridge course:
- (i) **Bridge Course 8:** ETO Course with High Voltage Segment or ETO Course (without High Voltage Segment) in accordance with STCW Training Circular 1 of 2011 and separately High Voltage Safety and Switch Gear Course.
- B. The Certification Regime**
1. **Training Record Books:**
- 1.1. The following Training Record Books may be required for cases where sea-service remissions is granted for structured training in accordance with the following provisions of the STCW Convention:
 - (i) TAR Book for Class IV (FG) CoC Certification.
 - (ii) TAR Book for Class IV (NCV) on ships with propulsion power less than 3000 KW.
 - (iii) TAR Book for ETO Certification
 - 1.2. Indian Navy will ensure completion of TAR Book and certify the same. In case the TAR Book is not completed in all respect, Indian Navy may certify completion based on the entire "portfolio of evidence" such as training courses satisfactorily completed and necessary sea service completed.
 - 1.3. The "Certificate of Assessment of Training Record Book" to be issued is attached as *Annexure 2* to this document.

2. Certification by Indian Navy for completion of Simulator and other Modular Courses:

- 2.1. Many of the following Modular courses are being conducted by Indian Navy with different names:
- E.R. Simulator course (Operational level)
 - E.R. Simulator Course (Management level)
 - High Voltage & Switch gear Safety Course (Mgmt. Level)
 - Boiler & Steam Engineering course (Operational & Management level)
 - Diesel Engine Combustion Gas Monitor Simulator Course.
- 2.2. In case training is given by Indian Navy for competencies detailed in above courses syllabus, the Indian Navy to certify the same as Annexure 3 "Certificate for Completion of Training in Modular Course". If same is not the case, the course is to be completed by the personal at approved MTI and MTI shall issue relevant digitized certificate as per normal procedures.

3. Certification of Personnel with B-Tech in Marine or Mechanical Engineering

- 3.1. The Certification schemes applicable for B-Tech Marine/Mechanical Engineers are detailed in Tables, 1, 2A, 2B, 3, 4 & 5 attached as Annexure to this document.
- 3.2. The format of qualifying Sea-service Certificate to be certified by Indian Navy is attached as Annexure 4 "Sea Service Testimonial for B-Tech Engineers".
- 3.3. The format of satisfactory educational and training completion certificate to be issued by Indian Navy for courses used for conducting gap assessment is attached as Annexure 5 "Certificate for Completion of Education and Training for B-Tech Engineers".
- 3.4. The completion of relevant Bridging Course conducted by Indian Navy to be certified as per attached Annexure 6 "Bridging Course completion Certificate for Indian Navy B-Tech Engineers". In case the courses are conducted by approved MTI, provisions shall be developed for issuance of digitized Certificates for Indian Navy specific Bridge courses in the existing e-governance system.
- 3.5. Prior assessment for meeting the requirements for CoC examination for Class II (FG) Certification under Regulation III/2, High Voltage & Switch gear Safety Course (Management Level) shall be completed at approved MTI or certified by Indian Navy as per Paragraph 4 above.

4. Certification of Indian Navy CHERA Course Qualified Personnel

- 4.1. The Certification schemes applicable for B-Tech Marine/Mechanical Engineers are detailed in Tables, 6, 7A, 7B, 8A & 8B attached as Annexure to this document.



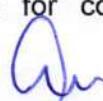
- 4.2. The format of qualifying Sea-service to be certified by Indian Navy is attached as Annexure 7 "Sea Service Testimonial for CHERA Course Qualified Artificers".
- 4.3. The format of satisfactory educational and training completion certificate to be issued by Indian Navy for courses used for conducting gap assessment is attached as Annexure 8 "Certificate for Completion of Education and Training by Mechanical Artificers".
- 4.4. The completion of relevant Bridging Course conducted by Indian Navy to be certified as per attached Annexure 9 "Bridging Course completion Certificate for CHERA Course Qualified Artificers". In case the courses are conducted by approved MTI, provisions shall be developed for issuance of digitized Certificates for Indian Navy specific Bridge courses in the existing e-governance system.

5. Certification of Indian Navy Personnel with B-Tech in Electrical/Electronic Engineering or Diploma in Radio/Power

- 5.1. The Certification schemes applicable for B-Tech Marine/Mechanical Engineers and Diploma in Radio/Power is detailed in Table 10 attached to this document. These personal shall be required to submit their degree/diploma certificate.
- 5.2. The format of qualifying Sea-service to be certified by Indian Navy is attached as Annexure 10 "Sea Service Testimonial for B-Tech Electrical/Electronic or Diploma in Radio/Power".
- 5.3. The format of satisfactory completion of educational and training certificate by B-Tech in Electrical/Electronic to be issued by Indian Navy for courses used for conducting gap assessment is attached as Annexure 11 "Certificate for Completion of Education and Training by B-Tech Electrical/Electronic Engineers".
- 5.4. The completion of relevant Bridging Course 8 conducted by Indian Navy to be certified as per attached Annexure 12 "Bridging Course completion Certificate for B-Tech Electrical/Electronic or Diploma Radio/Power".
- 5.5. Prior assessment for meeting the requirements for CoC examination ETO Certification under Regulation III/6, High Voltage & Switch gear Safety Course (Management Level) shall be completed at approved MTI or certified by Indian Navy as per Paragraph 4 above.
- 5.6. In case the courses are conducted by approved MTI, provisions shall be developed for issuance of digitized Certificates for Indian Navy specific Bridge courses in the existing e-governance system.

6. Certification of Indian Navy Mechanical and Electrical Ratings

- 6.1. The Certification schemes applicable is attached as Table 9. Indian Navy to certify completion of necessary approved sea going service and attainment of competencies as per attached Annexure 13 "Certificate for completion of



approved sea going service and attainment of necessary Competencies by Mechanical Ratings in Indian Navy".

6.2. The Certification schemes applicable is attached as Table 9. Indian Navy to certify completion of necessary approved sea going service as per attached Annexure 14 "Certificate for completion of approved sea going service by Electrical Ratings in Indian Navy". The TAR Book completion certificate to be submitted as per Annexure 2.

7. Bridge Courses and CoC Examinations to be conducted by Directorate General of Shipping & Allied Offices

7.1. The Annexures for Bridge Courses and the necessary written and oral examination for each Bridge Course is detailed as below, which may also contain questions related to latest technological developments on ships related to engines, machineries, electrical and electronics :

Bridge Course	Annexure	Subject	Number of hours of Written Paper	Orals
Bridge Course 1: For fulfilling gaps in education and training for Class IV FG CoC under Regulation III/1	15	Ship Safety and Environmental Protection	2	Yes
		MEK-General: Deck and Cargo Machineries	Nil	Yes
Bridge Course 2: For fulfilling gaps in education and training for Class II FG CoC under Regulation III/2. + High Voltage & Switch gear Safety Course (Mgmt. Level) at approved MTI, if not certified by IN.	16	MEK General & Motors:	3	Yes
		Marine Engineering Practice	3	Yes
		Electro-technology	3	Yes
		Naval Arch, Ship Construction & Ship Safety and Environmental Protection	3	Yes
Bridge Course 3: For fulfilling gaps in education and training for Class I FG CoC under Regulation III/2.	Training Circular 08 of 2012	Engineering Management	3	Yes
Bridge Course 4: For fulfilling gaps in education and training for Class IV-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/1.	17	Ship Safety and Environmental Protection	2	Yes
		MEK-General: Machineries of Engine Room Including Main Engine and Auxiliary machineries & Naval Architecture	2	Yes
Bridge Course 5: For fulfilling gaps in education and training for Class III-NCV-CEO CoC under Regulation III/3.	18	MEK General & Motors:	3	Yes
		Marine Engineering Practice	3	Yes
		Electro-technology	3	Yes
		Naval Arch, Ship Construction & Ship Safety and	3	Yes

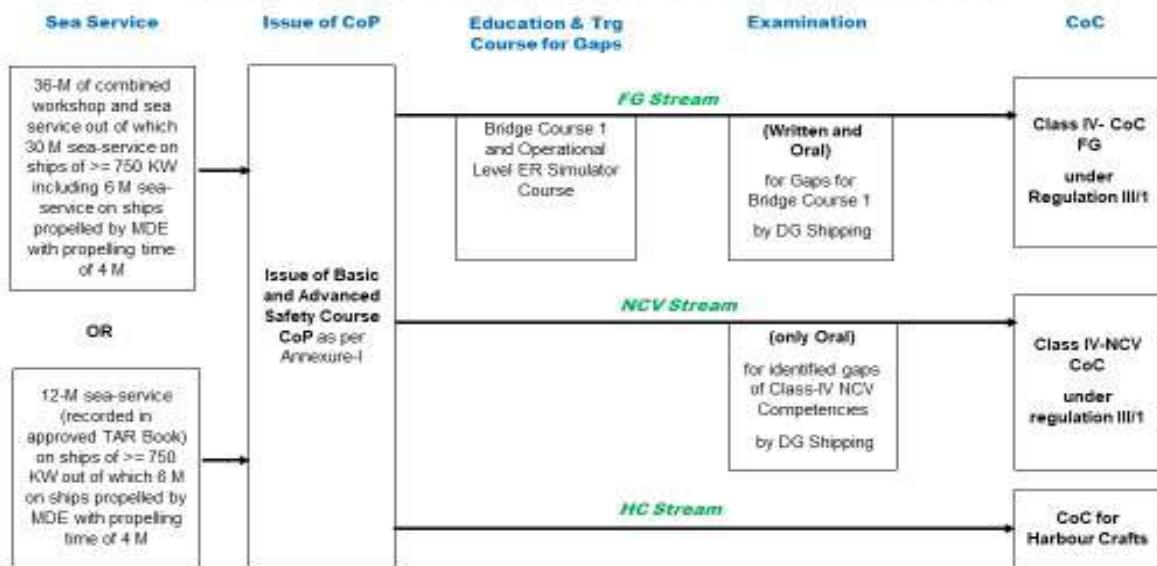
		Environmental Protection		
Bridge Course 6: For fulfilling gaps in education and training for Class III-NCV-CEO CoC under Regulation III/3.	Training Circular 25 of 2012	Engineering Management	3	Yes
Bridge Course 7: For fulfilling gaps in education and training of Indian Navy B-Tech Electrical/Electronic Engineers for Electro-Technical Officer CoC under Regulation III/6) + High Voltage & Switch gear Safety Course (Mgmt. Level) at approved MTI, if not certified by IN	19	Marine Electro-technology and Ship Safety & Environment Protection for Indian Navy Personal with B-Tech in Electrical/Electronic Engineers	2	Yes
Bridge Course 8: For fulfilling gaps in education and training of Indian Navy Diploma in Radio/Power Holders for Electro-Technical Officer CoC under Regulation III/6)	Training Circular 1 of 2012	Marine Electro-technology and Ship Safety & Environment Protection	3	Yes

8. It will be responsibility of Directorate & Indian Navy that any amendments to STCW Convention resulting in modification to existing courses, addition of new courses or any changes in STCW Rules are adopted by Indian Navy as required. The Indian Navy shall ensure that any changes (deletion of syllabus or reduction in number of training hours of a particular subjects) in existing courses used for gap analysis is conveyed to Directorate to suitably amend the Bridging Courses.



Tables: Part A of DGS Order 17 of 2022

Table 1-Transition of B-Tech (Mechanical or Marine Engineers) & MESC Course Qualified to Class IV- CoC FG or Class IV-NCV CoC or CoC for Harbour Crafts



Note: If the Naval personnel leaves IN after Class IV, he will have to follow the normal route as per other seafarers.

Table 2A : Transition of Indian Navy Personnel with Class IV CoC FG to Class III-NCV-SEO CoC to Class III NCV Chief Engineer CoC

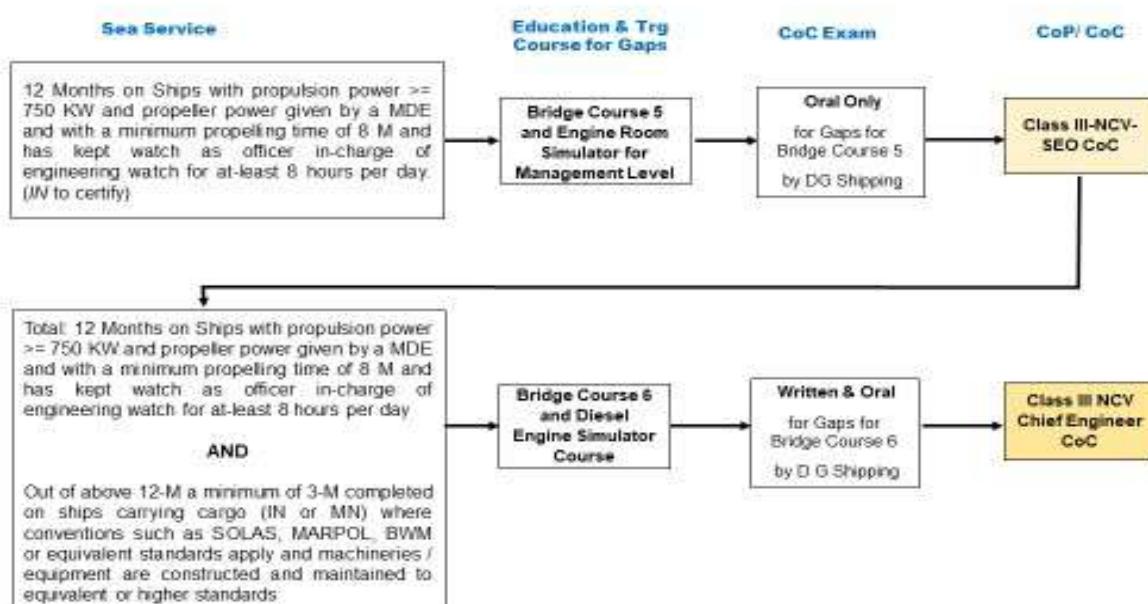
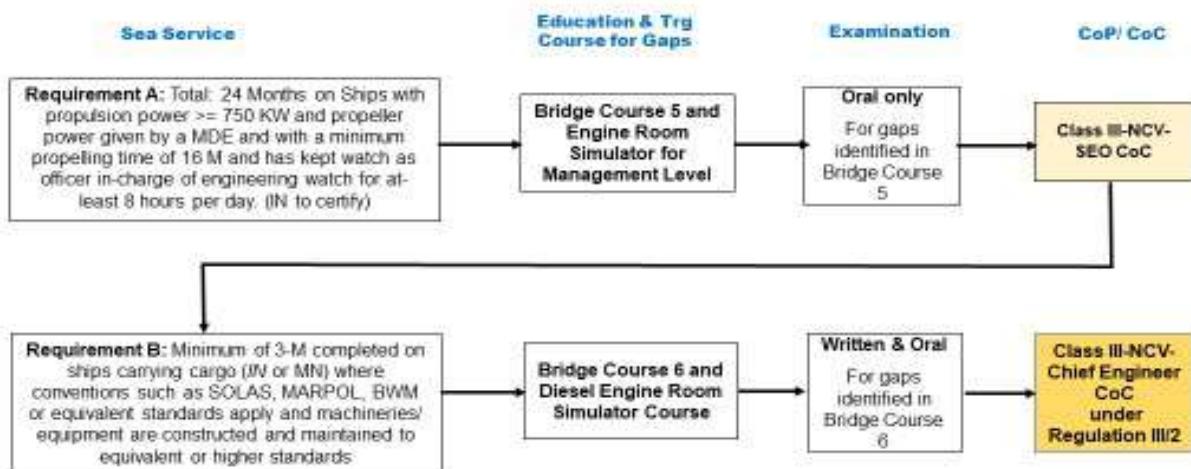
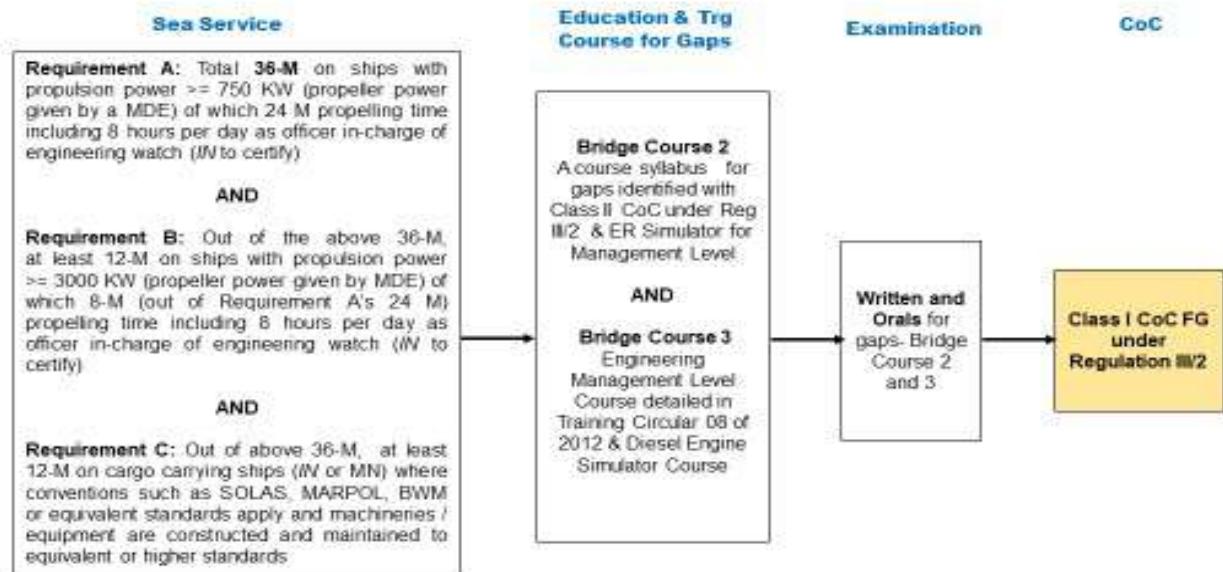


Table 2B : Transition of Indian Navy Personnel holding Class IV CoC FG To Class III-NCV-Chief Engineer CoC



Note: This scheme is applicable when sea service under Requirement A is completed while being in IN

Table 3 : Transition of Indian Navy Personnel holding Class IV CoC FG to Class I CoC FG



Note: This transition can only be availed if the complete sea service required under this transition is completed while being in the Indian Navy

Table 4 : Transition of Indian Navy Personnel holding Class IV CoC FG to Class II CoC Second Engineer and then Class I CoC Chief Engineer

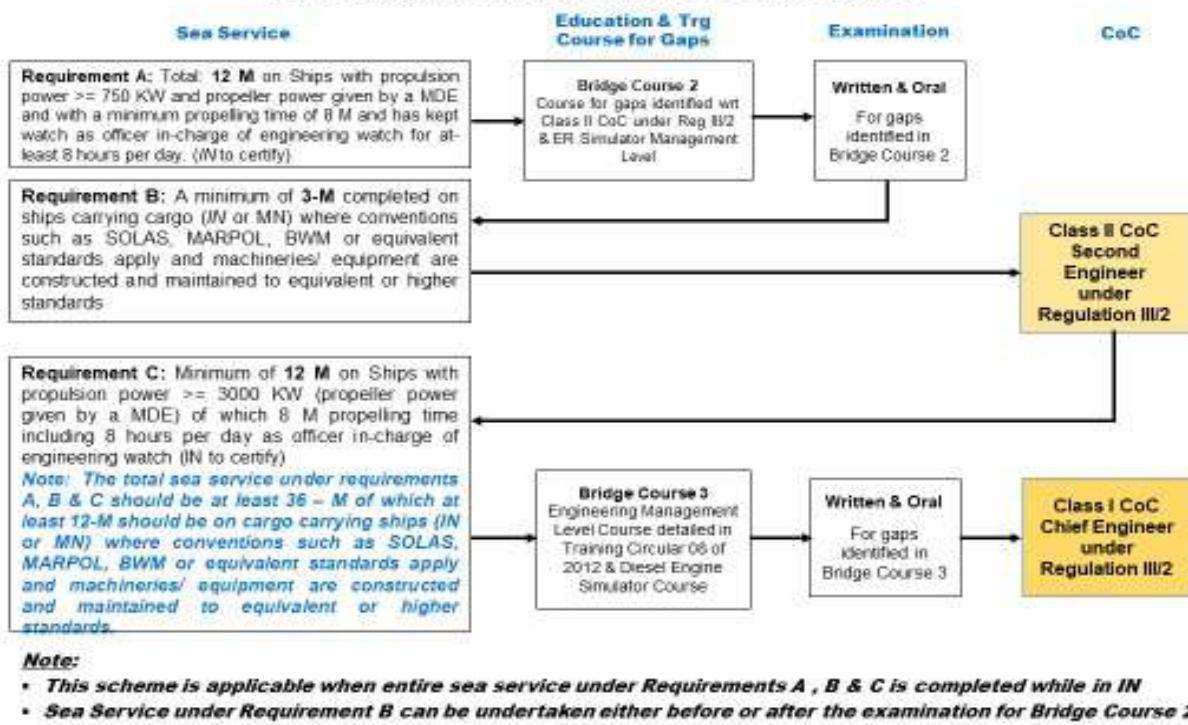


Table 5 : Transition of B-Tech (Mechanical or Marine Engineers) to Class I CoC FG without having any Lower CoC

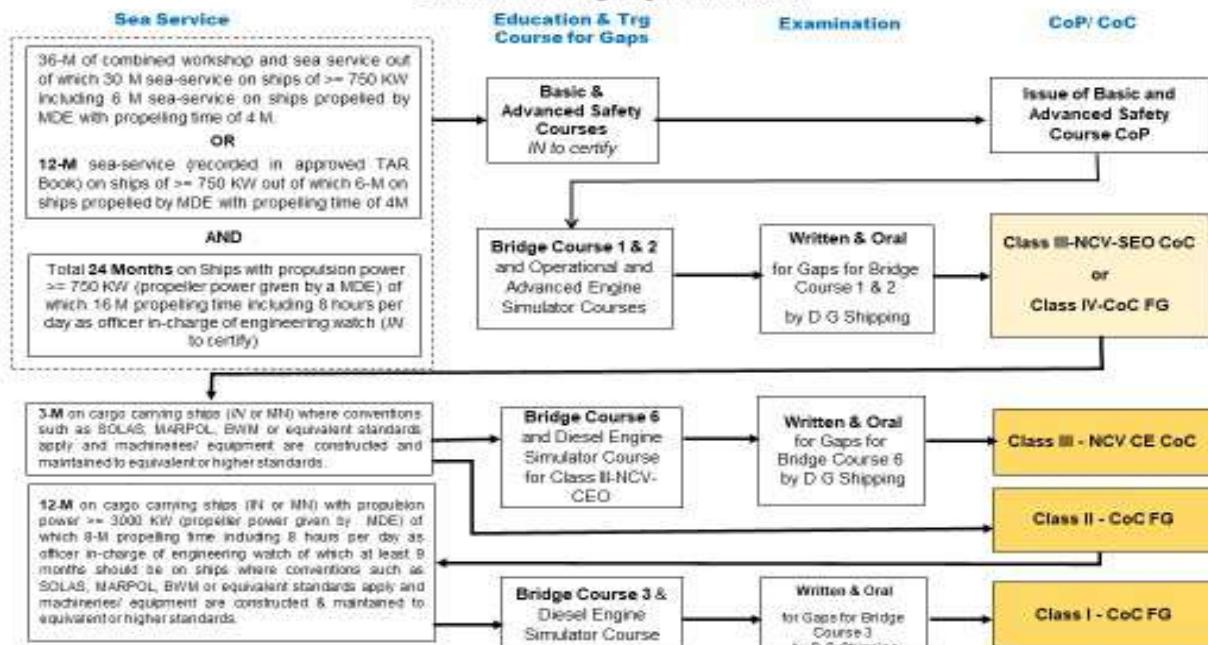


Table 6 : Transition of Indian Navy Personnel having CHERA Course Qualification to Class IV - NCV CoC to Class III - NCV (Second Engineer) CoC

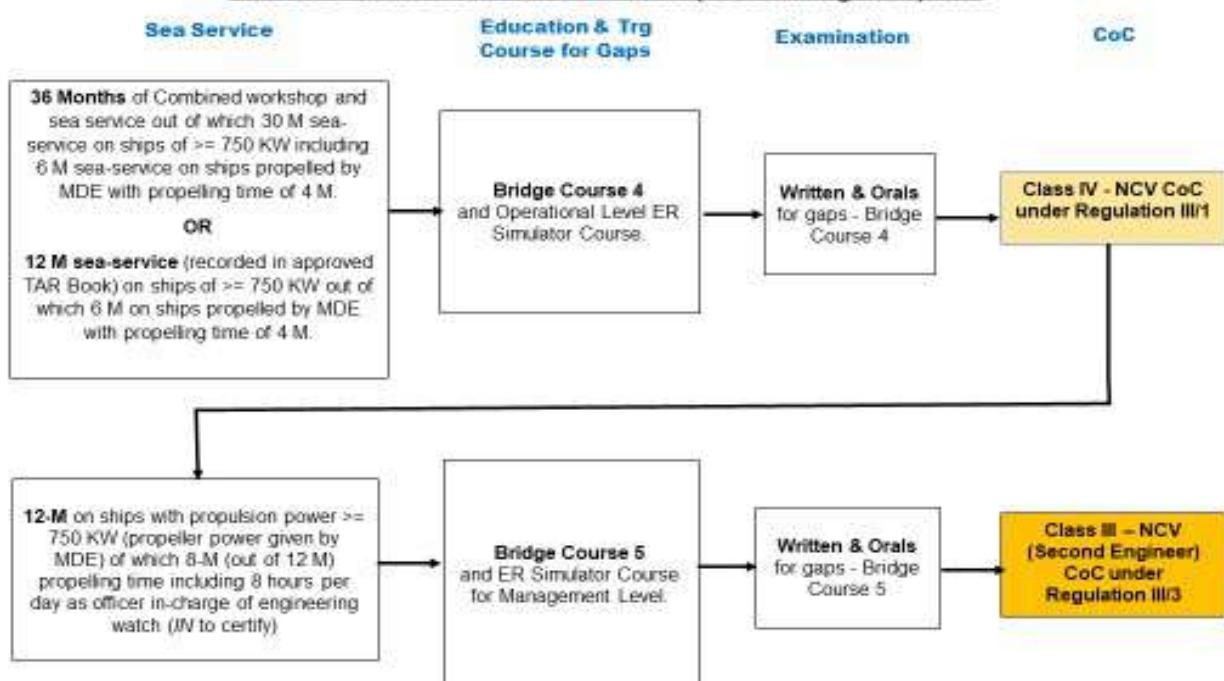
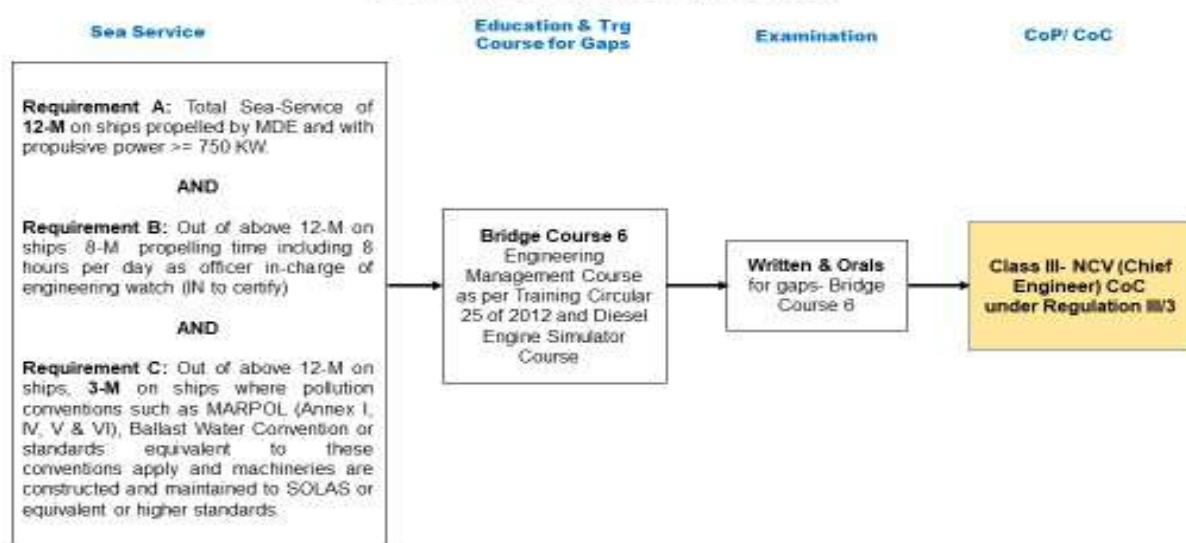
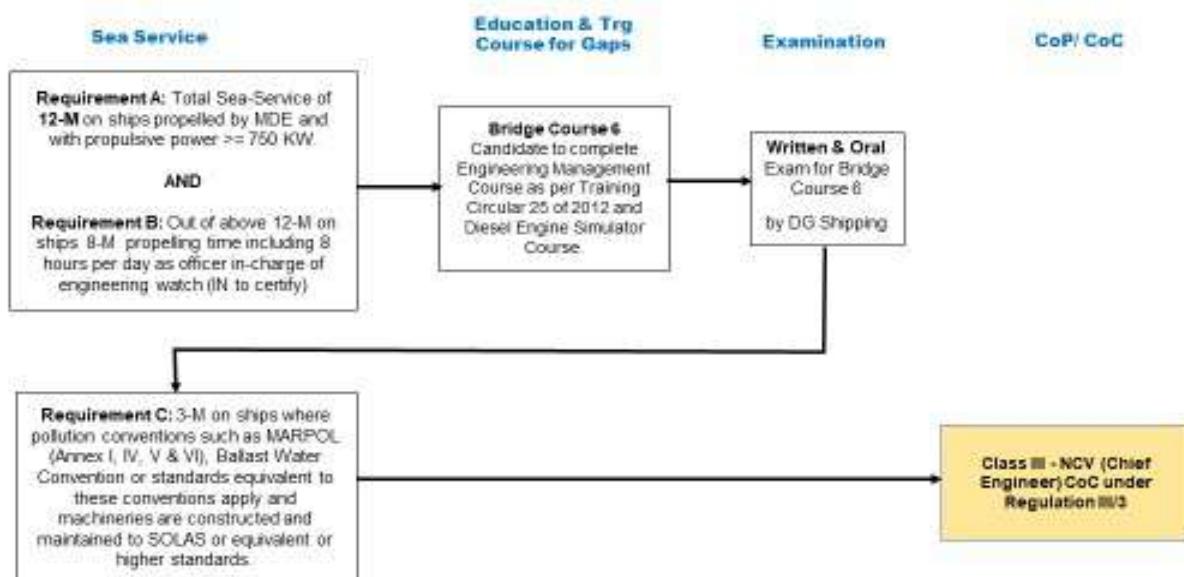


Table 7A : Transition of Indian Navy Personnel from Class III - NCV (Second Engineer) CoC to Class III - NCV (Chief Engineer) CoC



Note: This scheme is applicable if sea service under Requirement A, B & C is completed while being in IN.

Table 7B : Transition of Indian Navy Personnel from Class III - NCV (Second Engineer) CoC to Class III - NCV (Chief Engineer) CoC



Note: This scheme is applicable if sea service under Requirement A & B is completed while being in IN.

Table 8A : Transition of Indian Navy Personnel who have CHERA Course Qualification to Class III- NCV (Chief Engineer) CoC without Class IV-NCV

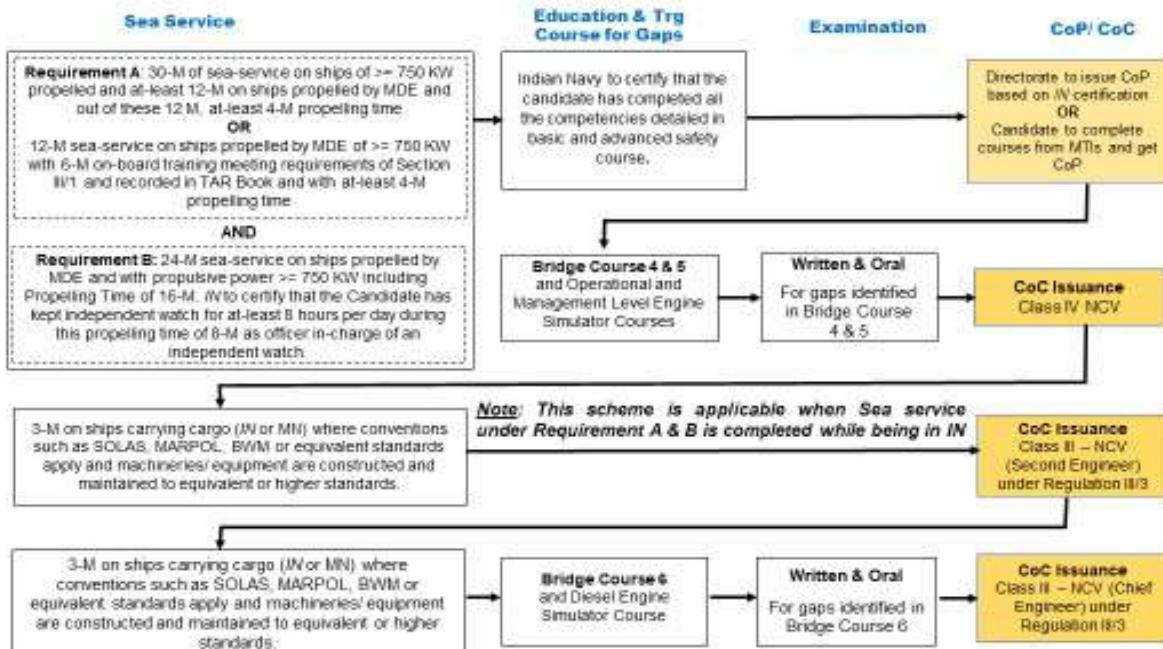
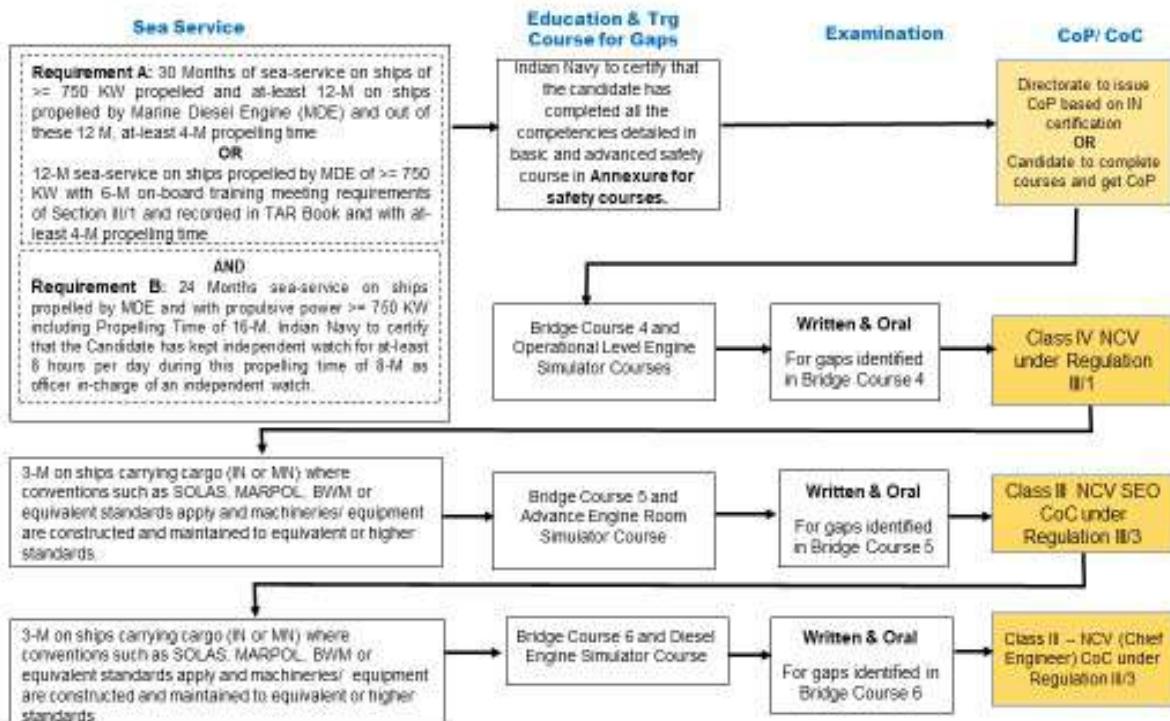
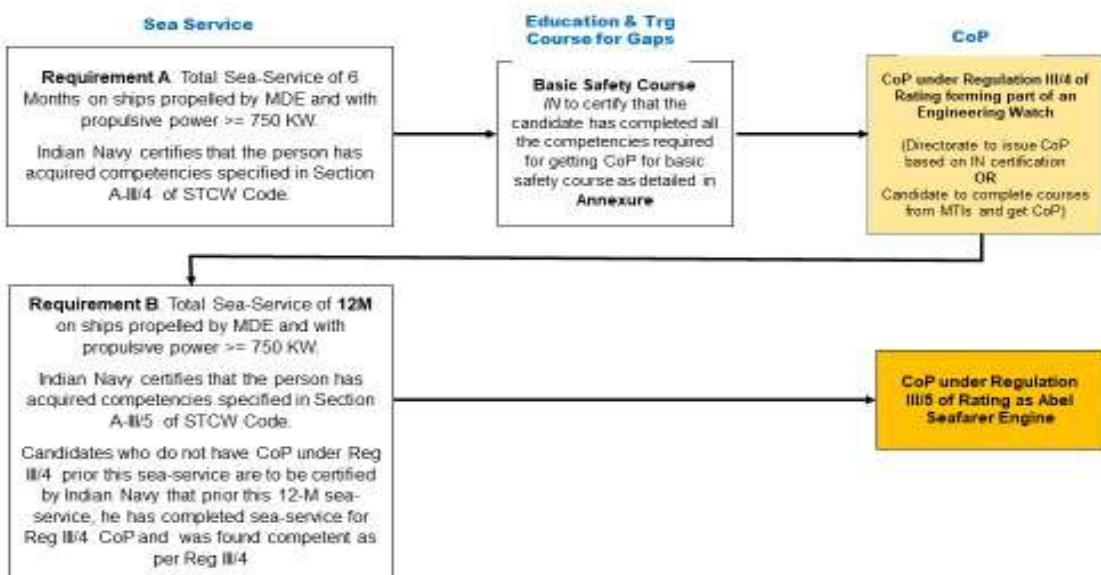


Table 8B : Transition of Indian Navy Personnel having CHERA Course Qualification to Class III- NCV (Chief Engineer) CoC without Class IV-NCV



Note: This scheme is applicable if sea service under Requirement A & B is completed while being in IN

Table 9 : Transition of Indian Navy Mechanical Rating



Note: 1. This scheme is applicable if sea service till III/5 CoP is completed while being in IN.

2. Seagoing service under Requirement B can be done before or after Basic Safety Course.

Table 10 : Transition of Indian Navy Personnel having Diploma in Radio or Power OR B-Tech Electrical and Electrical Specialized Course Qualification to ETO CoC

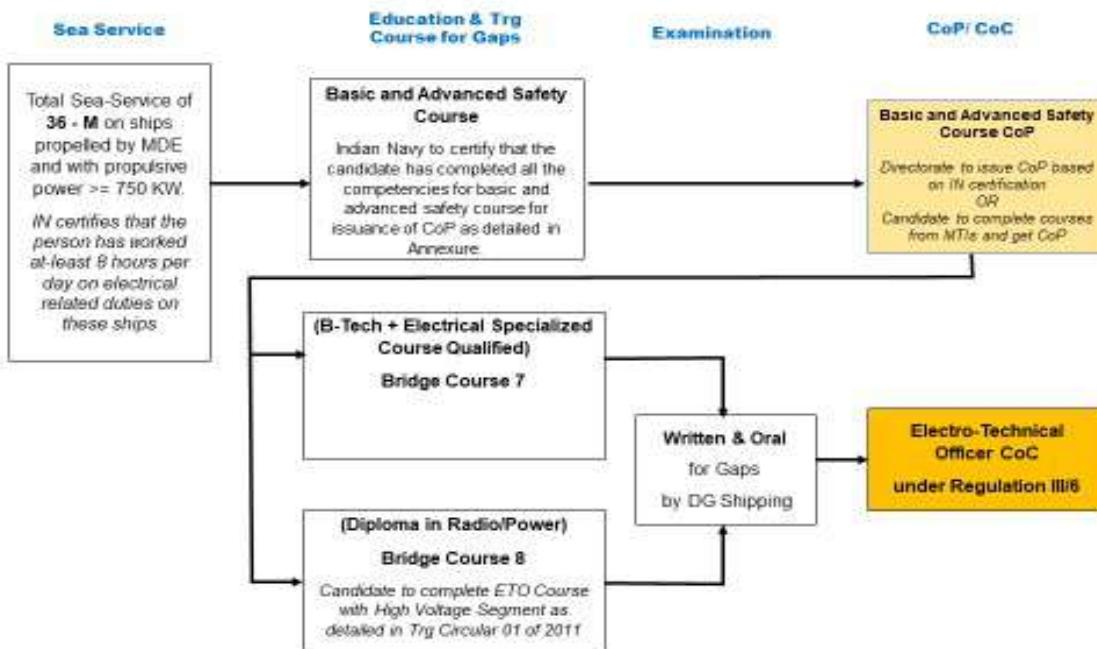
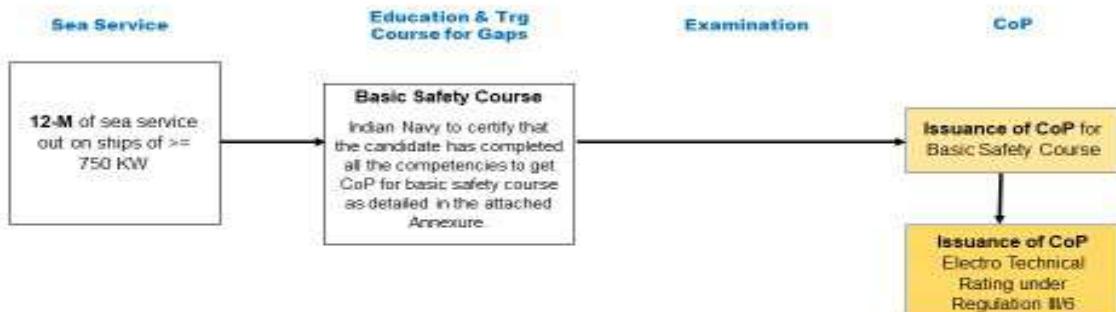


Table 11 : Transition of Indian Navy Electrical Rating to Electro Technical Rating



Indian Navy

Certificate for Completion of Training in Basic and Advanced Safety Courses

Annexure 1 to the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily completed following basic and advanced Safety and Modular Course (delete as applicable):

Training Course	Table of STCW Code	Section of STCW Code	Date From	Date To
Personal Survival Techniques (PST)	A-VI/1-1	A-VI/1		
Fire prevention and Fire Fighting (FPFF)	A-VI/1-2	A-VI/1		
Elementary First Aid (EFA)	A-VI/1-3	A-VI/1		
Personal Safety and Social Responsibilities (PSSR)	A-VI/1-4	A-VI/1		
Proficiency in Survival Craft and Rescue Boats other than Fast Rescue Boats (PSCRB)	A-VI/2-1	A-VI/2		
Proficiency in Fast Rescue Boats	A-VI/2-2	A-VI/2		
Advanced Fire Fighting (AFA)	A-VI/3	A-VI/3		
Medical First Aid (MFA)	A-VI/4-1	A-VI/4		
Medical Care	A-VI/4-1	A-VI/4		
Ship Security Officers (SSO)	A-VI/5	A-VI/5		
Seafarers with Designated Security Duties (SDSD)	A-VI/6-2	A-VI/6		

Signature and Stamp of Certifying Authority

Note:

1. Following courses require Refresher Training every 5-years that is 5-Years from date of completion: AFF, FPFF, PST, and PSCRB.
2. If above completed more than 5-years ago, refresher training at approved MTI shall be required to be completed after issuance of CoP by Directorate based on IN Certification.

Indian Navy

Certificate: Assessment of Training Record Book

Annexure 2: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily fulfilled the requirement of completion of Training as recorded in following Training Record Book (**delete as applicable**):

1. have completed combined workshop skill training and an approved seagoing service of not less than 12 months as part of an approved training programme which includes on-board training that meets the requirements of [section A-III/1](#) of the STCW Code and is documented in an approved training record book (to meet the Certification requirement for Class IV (FG) CoC under Regulation III/1).

OR

2. have completed combined workshop skill training and an approved seagoing service of not less than 12 months as part of an approved training programme which includes on-board training that meets the requirements of [section A-III/1](#) of the STCW Code and is documented in an approved training record book (to meet the Certification requirement for Class IV (NCV) on Ships of less than 3000 KW Propulsion Power CoC under Regulation III/1).

OR

3. have completed not less than 12 months of combined workshop skills training and approved seagoing service of which not less than 6 months shall be seagoing service as part of an approved training programme which meets the requirements of [section A-III/6](#) of the STCW Code and is documented in an approved training record book (to meet the Certification requirement for Electro Technical Officer under Regulation III/6).

Signature and Stamp of Certifying Authority

Indian Navy

Certificate for Completion of Training in Modular Courses

Annexure 3: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily fulfilled the requirement of completion of Training as recorded in following Training Record Book (**delete as applicable**):

Modular Course	Reference to TEAP B	Date From	Date To
Engine Room Simulator Course (Operational Level)	Appendix-III/1C		
Engine Room Simulator Course (Management Level)	Appendix-III/2C		
Diesel Engine Combustion Gas Monitor Simulator Course	Appendix-III/3A		
High Voltage Safety and Switch Gear Course (Management Level)	Appendix-III/9.1		
High Voltage Safety and Switch Gear Course (Operational Level)	Appendix-III/9.2		
Marine Boiler and Steam Engineering Course (Operational Level) Note 1	Appendix III/10		
Marine Boiler and Steam Engineering Course (Management Level) Note 2	Appendix III/10		

Note 1: This course is required to be completed for Class IV (FG) CoC exam, if required sea-service is not completed on ships fitted with Boilers.

Note 2: This course is required to be completed for Class II (FG) CoC exam, if required sea-service is not completed on ships fitted with Boilers.

Signature and Stamp of Certifying Authority

Indian Navy

Sea Service Testimonial for B-Tech in Marine/Mechanical Engineers

Annexure 4: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily fulfilled the requirement of completion of approved sea-going service as detailed below:

Name of Ship:	Details of Main Engine, Boiler and Auxiliary Engines:	IMO No.(If applicable)	Nature of Duties:	Propulsion Time (One day means 8 hours of watch)
		-----	<ul style="list-style-type: none">(i) Senior In full charge of regular watch on main engine and boiler simultaneously(ii) Senior In full charge of regular watch on main engine(iii) Assistant to Senior In full charge of regular watch on main engine and boiler simultaneously (for trainees)(iv) Assistant to Senior In full charge of regular watch on main engine (for trainees)	

Certify the following is applicable:

1. The conventions such as SOLAS, MARPOL, BWM or equivalent standards apply on this ship and machineries/ equipment are constructed & maintained to equivalent or higher standards.
2. This ship is a cargo ship carrying ----- (Write cargo carried)

Example of Technical Details:

MAIN ENGINE: HYUNDAI- MAN B&W 6S50MC: Direct reversible, Single acting 500 X 1910mm, X'hd type Turbocharged, Two stroke 8580KW @127rpm, Single screw Marine diesel engine

AUXILIARY ENGINE 3 NOS.: HUANDAI MAN B & W 5L23/30H POWER 750 KWA @720rpm

AUXILIARY BOILER 2 Nos.: Aalborg mission OL, Water tube Oil fired, Capacity:- 16 t/h, Heating surface :- 95 sq. m; Working Pressure :- 18 bar

COMPOSITE BOILER: Aalborg mission OC, Smoke tube Capacity:- 1/1.2 t/h; Heating surface:- 12/207 sq.m Working pressure :- 8 bar

Signature and Stamp of Certifying Authority

Indian Navy

Certificate for Completion of Education and Training Completion for B-Tec Engineers Annexure 5: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily completed following Education and Training Courses and meet the standards of competence specified in section A-III/1 of the STCW Code except as identified in Bridge Course 1

Course	Date From	Date To
Marine Engineering Specialized Course Phase I		
Marine Engineering Specialized Course Phase II		
Marine Engineering Specialized Course Phase III		
Marine Propulsion Control Technology Course		
Fire-fighting and damage control course		
Engineer Officer Technical Management Course		
Engineer Officer Information Technology and NBCD Concepts		
Fire Fighting and Fire Prevention Course		

Signature and Stamp of Certifying Authority

Indian Navy

Bridging Course completion Certificate for Indian Navy B-Tech Engineers

Annexure 6: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily completed following Bridge Courses (**delete as applicable**):

Bridge Course	Date From	Date To
Bridge Course 1 (For fulfilling gaps in education and training for Class IV FG CoC under Regulation III/1)		
Bridge Course 2 (For fulfilling gaps in education and training for Class II FG CoC under Regulation III/2)		
Bridge Course 3 (Engineering Management Course as per Training Circular xxxxxx under Regulation III/2)		

Signature and Stamp of Certifying Authority

Indian Navy

Sea Service Testimonial for Diploma in Mechanical Engineering/CHERA Course Qualified Artificers

Annexure 7: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactory fulfilled the requirement of completion of approved sea-going service as detailed below:

List all Ships as required:

Name of Ship:	Details of Main Engines and Auxiliary Engines	IMO No.(If applicable) -----	Nature of Duties: Senior In full charge of regular watch on main engine or Assistant to Senior In full charge of regular watch on main engine (for trainees)	Propulsion Time (One day means 8 hours of watch)

Certify the following is applicable:

1. The conventions such as SOLAS, MARPOL, BWM or equivalent standards apply on this ship and machineries/ equipment are constructed & maintained to equivalent or higher standards.
2. This ship is a cargo ship carrying ----- (Write cargo carried)

Example of Technical Details:

MAIN ENGINE: HYUNDAI- MAN B&W 6S50MC: Direct reversible, Single acting 500 X 1910mm, X'hd type Turbocharged, Two stroke 8580KW @127rpm, Single screw Marine diesel engine

AUXILIARY ENGINE 3 NOS.: HUANDAI MAN B & W 5L23/30H POWER 750 KWA @720rpm

Signature and Stamp of Certifying Authority

Indian Navy

Certificate for Completion of Education and Training by Mechanical Artificers

Annexure 8: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily completed following Education and Training Courses and meet the standards of competence specified in [section A-III/1](#) taking into account Paragraph 10 of Section A-III/1 of the STCW Code except as identified in Bridge Course 4

Course	Date From	Date To
Merged Artificer Apprentice course (MAAC) A		
Merged Artificer Apprentice course (MAAC) B		
Merged Artificer Apprentice course (MAAC) C		
Merged Artificer Apprentice course (MAAC) D		
Chief Artificer Qualification Course		
Class of Ship training PCT Course		
Fire-fighting and damage control course		

Signature and Stamp of Certifying Authority

Indian Navy

Bridging Course completion Certificate for CHERA Course Qualified Artificers

Annexure 9: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactory fulfilled the requirement of completion of Training as recorded in following Training Record Book (**delete as applicable**):

Bridge Course	Date From	Date To
Bridge Course 4 (For fulfilling gaps in education and training for Class IV-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/1)		
Bridge Course 5 (For fulfilling gaps in education and training for Class III-SEO-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/3)		
Bridge Course 6 (Engineering Management Course as per Training Circular xxxx for Class III-CEO-NCV CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/3)		

Signature and Stamp of Certifying Authority

Indian Navy

Sea Service Testimonial for B-Tech Electrical/Electronic or Diploma in Radio/Power Annexure 10: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

1. have completed not less than 36 months of combined workshop skills training and approved seagoing service of which not less than 30 months shall be seagoing service in the engine department as required by Para 2.2 of STCW Regulation III/6; *his sea-service details are:*

List all Ships:

Name of Ship	GT	Date From	Date To	Marine Engine	Diesel MCR

Signature and Stamp of Certifying Authority

Indian Navy

Certificate for Completion of Education and Training by B-Tech Electrical/Electronic Engineers

Annexure 11: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has completed following approved education and training and meet the standard of competence specified in section A-III/6 of the STCW Code except as identified in Bridge Course 7.

Course	Date From	Date To
Electrical Specialization Course (MESC) Phase I		
Electrical Specialization Course (MESC) Phase II		
Electrical Specialization Course (MESC) Phase III		
Leadership and Management Course		
Financial & Inventory Management Course		
Advanced Technology Course		
Competence Course		
Fire-fighting and damage control course		

Signature and Stamp of Certifying Authority

Indian Navy

Bridging Course completion Certificate for B-Tech Electrical/Electronic or Diploma Radio/Power

Annexure 12: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily completed following Bridge Courses (**delete as applicable**):

Bridge Course	Date From	Date To
Bridge Course 7 (For fulfilling gaps in education and training for Electro-Technical Officer CoC under Regulation III/6)		
Bridge Course 8 (ETO Course with High Voltage Segment as per STCW Training Circular 1 of 2011)		
Bridge Course 8 (ETO Course without High Voltage Segment as per STCW Training Circular 1 of 2011) Annexure 3 for completion of High Voltage Safety and Switch Gear Course (Management Level) to be also submitted.		

Signature and Stamp of Certifying Authority

Indian Navy

Certificate for completion of approved sea going service and attainment of necessary Competencies by Mechanical Ratings in Indian Navy

Annexure 13: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

- A.** has satisfactorily fulfilled the *mandatory minimum requirements for certification of ratings forming part of a watch in a manned engine-room or designated to perform duties in a periodically unmanned engine-room as per Regulations III/4 of the STCW Convention and his sea-service details are (delete if CoP is requested for Regulation III/5 after completion of necessary service after getting CoP under Regulation III/4):*

List all Ships:

Name of Ship	GT	Date From	Date To	Marine Engine MCR	Diesel

- B.** has satisfactorily fulfilled the *mandatory minimum requirements for certification of ratings as able seafarer engine in a manned engine-room or designated to perform duties in a periodically unmanned engine-room as per Regulations III/5 of the STCW Convention and his sea-service details are (delete if CoP is requested for Regulation III/4):*

List all Ships

Name of Ship	GT	Date From	Date To	Marine Engine MCR	Diesel

- C.** Details of CoP under Regulation: III/4: Number and Date of Issue

Signature and Stamp of Certifying Authority

Note:

If CoP under Regulation III/5 is required without having CoP under Regulation III/4, complete A & B only.

If CoP under Regulation III/4 is required, complete A only.

If CoP under Regulation III/5 is required after getting under Regulation III/4, complete B & C only

Indian Navy

Certificate for completion of approved sea going service by Electrical Ratings in Indian Navy

Annexure 14: Part A of the DGS Order 17 of 2022

This is to certify that:

Name of Candidate:

Date of Birth:

Indian National Database for Seafarer (INDOS) No.:

CDC Number:

has satisfactorily fulfilled the *mandatory minimum requirements for certification of electro-technical ratings on ships of propulsive power 750 KW or more as per Regulations III/7 of the STCW Convention and meet the standard of competence specified in section A-III/7 of the STCW Code.*

His sea-service details are:

List all Ships:

Name of Ship	GT	Date From	Date To	Marine Engine MCR	Diesel MCR

Signature and Stamp of Certifying Authority

Bridge Course 1

(For fulfilling gaps in education and training for Class IV FG CoC under Regulation III/1)

Annexure 15 of Part A of the DGS Order 17 of 2022

Function: Marine Electro Technology		
Competence	Syllabus	Hours
High Voltage Installations	<ol style="list-style-type: none"> 1. States that more than 1,000 V is usually called high voltage 2. States how and why high-voltage installations are used on board ships 3. States what voltages are mostly used as high voltage on board ships 4. describes equipment/installations in high-voltage systems such as high-voltage generator, distribution board, motors, etc. 5. States the special characteristics and features of high-voltage installations in comparison with less than 1,000 V 6. States that high-voltage systems are normally earthed via a resistor – explains how the presence of earth faults is indicated in a high-voltage system with an earthed neutral 7. States safety precautions to be strictly observed to prevent accidents when working on high-voltage electrical equipment – states that any operation of high-voltage installations must be carried out remotely at places where a certain distance is being kept from the installations. 	5 hours
Function: Marine Engineering Knowledge General		
Deck Machineries	<p>Windlass/mooring winch</p> <ol style="list-style-type: none"> 1. Describes what components construct typical electric/hydraulic windlass/ mooring winch systems 2. Explains the construction of windlass/mooring winch with visual aids/ illustrations of typical ones. 3. Explains the operation mechanism of windlass/mooring winch with visual aids/ illustrations of typical ones 4. Explains in simple words, speed control mechanism used in windlass/mooring winch with visual aids/illustrations of typical ones <p>Winch</p> <ol style="list-style-type: none"> 1. Describes components used in the construction of typical electric/hydraulic winch systems. 2. Explains the construction of a winch with visual 	10 hours

	<p>aids/illustrations of typical ones.</p> <p>3. Explains the operation mechanism of a winch with visual aids/illustrations of typical ones.</p> <p>4. Explains in simple words, speed control mechanism used in winch with visual aids/illustrations of typical ones</p> <p>Boat winch</p> <p>1. Explains the construction of a boat winch with visual aids/illustrations of typical ones.</p> <p>2. Explains the operation mechanism of a boat winch with visual aids/illustrations of typical ones.</p>	
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Function: Ship Safety and Environmental Protection

Monitor Compliance with Legislative Requirement	Introduction to Maritime Law(1 hour)	32 hours
	<p>1. States that maritime law is based partly on generally accepted customary rules developed over many years and partly on statute law enacted by states</p> <p>2. States that matters of safety, protection of the marine environment and conditions of employment are covered by statute law.</p> <p>3. States that the main sources of maritime law are international conventions – states that the adoption of international conventions and agreements is intended to provide uniform practice internationally.</p> <p>4. States that a convention is a treaty between the States which have agreed to be bound by it to apply the principles contained in the convention within their sphere of jurisdiction.</p> <p>5. States that, to implement a convention or other international agreement, a State must enact national legislation giving effect to and enforcing its provisions.</p> <p>6. States that recommendation which are not internationally binding may be implemented by a State for ships flying its flag.</p> <p>7. Lists the main originators of international conventions concerned with maritime law are: International Maritime Organization (IMO); International Labour Organization (ILO); Comite Maritime International (CMI); United Nations</p> <p>8. Describes: flag State jurisdiction, coastal State jurisdiction, port State jurisdiction</p> <p>9. Describes main elements of relevant IMO</p>	

	<p>Conventions, e.g. MLC 2006, SOLAS, MARPOL and STCW.</p> <p>10. Explains the significance of the 'no more favourable treatment' clause in the SOLAS, MARPOL, STCW and MLC Conventions.</p> <p>11. Distinguishes between private and public international law.</p> <p>12. Explains that public maritime law is enforced through: surveys, Audits, inspection and certification; penal sanctions (fines, imprisonment); administrative procedures (inspection of certificates and records, detention).</p> <p>13. States that the operation of a ship is governed by the national laws and regulations of the flag State, including those laws and regulations giving effect to international conventions.</p> <p>14. States that differences of detail usually exist in the national laws of different states implementing the same convention.</p> <p>15. States that, when serving in a ship flying a foreign flag, it is essential that the master and chief mate familiarize themselves with the laws and regulations of the flag State.</p> <p>16. States that, when in port, a ship must also comply with the appropriate laws and regulations of the port State – describes the importance of keeping up to date with developments in new and amended legislation</p> <p>Law of the Sea (4 hours)</p> <ol style="list-style-type: none"> 1. Conventions on the Law of the Sea. 2. Territorial Sea and the Contiguous Zone. 3. International Straits. 4. Exclusive Economic Zone and Continental Shelf. 5. High Seas. 6. Protection and Preservation of the Marine Environment <p>Safety(27 hours)</p> <p>International Convention on Load Lines, 1966 (LL 1966), as amended</p> <ol style="list-style-type: none"> 1. States that no ship to which the Convention applies may proceed to sea on an international voyage unless it has been surveyed, marked and provided with an international Load Line Certificate (1966) or an international Load Line Exemption Certificate, if appropriate. 	
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	<ol style="list-style-type: none"> 2. Explains to which ships the Convention applies – describes the duration of validity of an International Load Line Certificate (1966). 3. Explains the circumstances in which an International Load Line Certificate (1966) would be cancelled by the Administration. 4. States the control to which ships holding an international Load Line Certificate (1966) are subject when in the ports of other Contracting Governments. 5. Describes for the purposes of the Regulations concerning: freeboard; freeboard deck; superstructure. 6. Describes the position, dimensions and marking of: the deck line; the Load Line Mark; lines to be used with the Load Line Mark. 7. States that the circle lines and letters are to be painted in white or yellow on a dark ground or in black on a light ground and that they should be permanently marked on the sides of the ship. 8. States that the international Load Line Certificate (1966) will not be delivered to a ship until the surveyor has certified that the marks are correctly and permanently indicated on the ship's sides. 9. Describes the requirements concerning the provision of closing appliances for ventilators. 10. States that means, permanently attached, should be provided for closing the openings of air pipes to ballast tanks and other tanks. 11. Describes the provisions for the protection of the crew. 12. States that deck cargo should be so stowed as to allow for the closing of openings giving access to crew's quarters, machinery space and other parts used in the necessary work of the ship. <p>International Convention for the Safety of Life at Sea, 1974 as amended (SOLAS): General Provisions.</p> <p>SOLAS – Subdivision and Stability, Machinery and Electrical Installation</p> <ol style="list-style-type: none"> 1. Defines, with reference to chapter II-1: subdivision load line, deepest subdivision load line, length, breadth, draught, bulkhead deck, margin line, permeability of a space – machinery space, passenger spaces, watertight. 2. Explains what is meant by 'floodable length'. 	
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	<ol style="list-style-type: none"> 3. Explains what is meant by 'factor of subdivision'. 4. Explains the application of the factor of subdivision to a passenger ship's ability to withstand the flooding of adjacent main compartments. 5. Describes the requirements regarding unsymmetrical flooding. 6. States that the master should be supplied with suitable information concerning the use of cross-flooding fittings. 7. Describes the final conditions of the ship after assumed critical damage. 8. States that the master should be supplied with the data necessary to maintain sufficient intact stability under service conditions to enable the ship to withstand the critical damage. 9. States that the conditions of stability on which the calculations of heel are based should be supplied to the master of the ship. 10. States that excessive heeling might result should the ship sustain damage when in a less favourable condition. 11. States that water ballast should not in general be carried in tanks intended for oil fuel and describes the arrangement for ships which cannot avoid putting water in oil fuel tanks. 12. Describes the marking of subdivision load lines on passenger ships. 13. States that details of the subdivision load lines assigned and the conditions of service for which they are approved should be clearly indicated on the Passenger Ship Safety Certificate. 14. States that a ship should not be loaded so as to submerge the load line mark appropriate to the season and locality, as determined in accordance with the international Convention on Load Lines, whatever the position of the subdivision load line marks may be. 15. States that a ship should not be loaded so as to submerge the subdivision load line mark appropriate to the particular voyage and condition of service. 16. Classifies watertight doors as: class 1 – hinged doors; class 2 – hand-operated sliding doors; class 3 – sliding doors which are power-operated as well as hand-operated. 	
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	<p>17. Describes the provisions regarding the fitting of watertight doors in passenger ships.</p> <p>18. States that watertight doors in bulkheads dividing cargo between deck spaces must be closed before the voyage commences and must be kept closed during navigation.</p> <p>19. States that the time of opening between-deck doors in port and the time of closing them before leaving port should be entered in the logbook.</p> <p>20. States that all watertight doors should be kept closed during navigation except when necessarily opened for the working of the ship, in which case they should always be ready to be immediately closed.</p> <p>21. States that in passenger ships carrying goods vehicles and accompanying personnel indicators are required on the navigating bridge to show automatically when each door between cargo spaces is closed and all door fastenings are secured.</p> <p>22. States that side scuttles the sills of which are below the margin line, should be of such construction as will effectively prevent any person opening them without the consent of the master.</p> <p>23. States that certain side scuttles in between-deck spaces must be closed watertight and locked before the ship leaves port and must not be opened before arrival at the next port.</p> <p>24. Describes the requirements for deadlights.</p> <p>25. States that side scuttles and deadlights which will not be accessible during navigation must be closed and secured before the ship leaves port.</p> <p>26. States that the closing and locking of side scuttles and deadlights in spaces used alternatively for the carriage of passengers or cargo should be recorded in a logbook when carrying cargo.</p> <p>27. States the requirements for the closure of cargo loading doors in passenger ships.</p> <p>28. Describes the requirements for drills, operation and inspection of watertight doors and other openings in passenger ships.</p> <p>29. States that valves, doors and mechanisms should be suitably marked to ensure that they may be properly used to provide maximum safety.</p> <p>30. Lists the entries which should be made in the</p>	
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	<p>logbook regarding the opening and closing of doors, side scuttles and other openings and the drills and inspections required by the regulations.</p> <p>31. States that every passenger ship and every cargo ship of 24 metres and upwards must be inclined upon its completion and the elements of its stability determined.</p> <p>32. States that the master should be supplied with such information as is necessary to obtain accurate guidance as to the stability of the ship under varying conditions of service.</p> <p>33. Describes the contents of damage control plans for passenger ships.</p> <p>34. States that booklets containing the damage control information should be made available to the ship's officers.</p> <p>35. Describes the recommendations on damage control for dry cargo ships.</p> <p>36. Describes the indicator system which must be provided on the navigating bridge of passenger ro-ro ships to show if shell doors, loading doors and other closing appliances are not fully closed or not secured.</p> <p>37. States the requirements for the detection of water leakage through shell doors or vehicle loading doors which could lead to major flooding of special category spaces or ro-ro cargo spaces.</p> <p>38. States the requirements for ro-ro cargo spaces to be monitored whilst the ship is under way.</p> <p>SOLAS – Fire Protection, Fire Detection and Fire Extinction</p> <ol style="list-style-type: none"> 1. Outlines the basic principles of the regulations on fire protection. 2. Explains briefly the properties of class 'A' and class 'B' divisions 3. Defines: main vertical zones, accommodation spaces, public spaces, service spaces cargo spaces, ro-ro cargo spaces (open and closed), special category spaces, machinery spaces of category A, control stations. 4. States that fire hoses should be used only for the purposes of extinguishing fires or testing the apparatus at fire drills and surveys. 5. Outlines the content of the SOLAS training manual and maintenance manual. 6. Describes the information included in fire control 	
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	<p>plans or booklets.</p> <ol style="list-style-type: none"> 7. States that instructions concerning the maintenance and operation of all firefighting equipment and installations on board should be kept under one cover in an accessible position. 8. States that a duplicate set of fire control plans or booklet should be permanently stored in a prominently marked weather-tight enclosure outside the deckhouse for the assistance of shore-side fire-fighting personnel. 9. States that all fire-extinguishing appliances must be kept in good order and available for immediate use at all times during the voyage. 10. States that passenger ships must at all times when at sea, or in port, be so manned or equipped that any initial fire alarm is immediately received by a responsible member of the crew. 11. States that a special alarm, operated from the navigating bridge or from the fire control station, should be fitted to summon the crew and should be capable of being sounded independently of the alarm to the passenger spaces. 12. States that an efficient patrol system must be maintained for ships carrying more than 36 passengers. 13. Describes the training required by the fire patrol. 14. States that there are special requirements for ships carrying dangerous goods. 15. States that a ship should have a document provided by the Administration as evidence of compliance of construction and equipment with the requirements for the carriage of dangerous goods. 	
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SOLAS – Life-Saving Appliances and Arrangements

1. Defines with reference to chapter III of SOLAS: certificated person, float-free launching, inflatable appliance, inflated appliance, launching appliance or arrangement, rescue boat, survival craft.
2. States that life-saving appliances and arrangements required by chapter III of SOLAS must be approved by the Administration.
3. States the requirements for exhibiting muster lists.
4. Describes the illustrations and instructions to be displayed in passenger cabins and other spaces.
5. Lists the items to be included in muster lists and

	<p>emergency instructions.</p> <ol style="list-style-type: none"> 6. Describes the provision of operating instructions for life-saving appliances. 7. Explains how the crew should be assigned to survival craft to ensure satisfactory manning and supervision of survival craft. 8. States that the person in charge of a survival craft should have a list of its crew and should see that they are acquainted with their duties. 9. States the requirement for the provision of training manuals. 10. Lists the items which should be contained in the training manuals. 11. Lists the items which should be contained in the maintenance manual. 12. Describes the frequency of abandon ship drills and fire drills and how they should be conducted. 13. Describes the guidelines for training crews for the purpose of launching lifeboats and rescue boats from ships making headway through the water. 14. Describes the on-board training which should be given in the use of life-saving appliances and in survival at sea. 15. Details the records which should be made of abandon ship drills and fire drills, other drills of life-saving appliances and on-board training. 16. States that before leaving port and at all times during the voyage, all life-saving appliances must be in working order and ready for immediate use. 17. Describes the instructions for on-board maintenance of life-saving appliances which should be carried. 18. Describes the regulation regarding the maintenance of falls. 19. Describes the weekly and monthly tests and inspections required and the entries which should be made in the logbook. 20. Describes the requirements regarding the periodic servicing of inflatable life-rafts, inflatable lifejackets, inflated rescue boats and hydrostatic release gear. 21. Describes the requirements for passenger muster stations. 22. States that, on passenger ships, an abandon ship drill and a fire drill must take place weekly. 	
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	<p>SOLAS – Carriage of Grain</p> <ol style="list-style-type: none"> 1. Lists the intact stability requirements for a ship carrying bulk. 2. Lists the contents of the grain loading information referred to in the document of authorizations. <p>SOLAS – Carriage of Dangerous Goods</p> <ol style="list-style-type: none"> 1. States that the regulations concerning the carriage of dangerous goods in packaged form or in solid bulk form apply to all ships to which the SOLAS regulations apply and to cargo ships of less than 500 gross tons. 2. States that the provisions do not apply to ships' stores and equipment. 3. States that the carriage of dangerous goods is prohibited except in accordance with the provisions of the regulations. 4. States that the provisions should be supplemented by detailed instructions on safe packaging and stowage, which should include the precautions necessary in relations to other cargo, issued by each Contracting Government. 5. Classifies dangerous goods according to the IMDG Code. 6. States that the correct technical name of goods, and not trade names, should be used in all documents relating to the carriage of dangerous goods. 	
<p>Ensure Compliance With Pollution Prevention Requirements</p>	<p>Precautions to be taken to prevent Pollution of the Marine Environment</p> <p>MARPOL 73/78 Technical Annexes: Annex I to VI of MARPOL 73/78 (14 HRS)</p> <ol style="list-style-type: none"> 1. Defines, for the purpose of MARPOL 73/78: harmful substance, discharge, ship, incident. 2. States that violations of the Convention are prohibited and that sanctions should be established for violations, wherever they occur by the Administration of the ship concerned. 3. Describes the inspections which may be made by port State authorities and outlines actions which they may take. 4. Describes the provisions for the detection of violations and enforcement of the Convention. 5. States that reports on incidents involving harmful substances must be made without delay. 	<p>18 hours</p>

	<p>6.</p> <p>Annex I – Oil</p> <ol style="list-style-type: none"> 1. Defines, for the purposes of Annex I: oil, oily mixture, oil fuel, oil tanker, combination carrier, nearest land, special area, instantaneous rate of discharge of oil content, wing tank, centre tank, slop tank, clean ballast, segregated ballast. 2. Describes the surveys and inspections required under the provisions of MARPOL 73/78. 3. Describes the steps which may be taken if a surveyor finds that the condition of the ship or its equipment is unsatisfactory. 4. States that the condition of the ship and its equipment should be maintained to conform with the provisions of the Convention. 5. States that the certificate issued after survey is the International Oil Pollution Prevention (IOPP) Certificate. 6. States that the IOPP Certificate should be available on board the ship at all times – lists the conditions under which oily mixtures may be discharged into the sea from an oil tanker. 7. Lists the conditions under which oily mixtures from machinery-space bilges may be discharged into the sea. 8. States that the provisions do not apply to the discharge of clean or segregated ballast. 9. Describes the conditions under which the provisions do not apply to the discharge of oily mixtures from machinery spaces where the oil content without dilution does not exceed 15 parts per million. 10. States that residues which cannot be discharged into the sea in compliance with the regulations must be retained on board or discharged to reception facilities. 11. List the special areas for the purposes of Annex I. 12. States that any discharge into the sea of oil or oily mixtures from an oil tanker or other ships of 400 tons gross tonnage and above is prohibited while in a special area. 13. Describes the conditions under which an oil tanker may discharge oily mixtures through ODMCS. 14. Describes the conditions under which a ship, other than an oil tanker, may discharge oily mixtures in a 	
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	<p>special area.</p> <p>15. States that the regulation does not apply to the discharge of clean or segregated ballast.</p> <p>16. Describes conditions in which processed bilge water from machinery spaces may be discharged in a special area.</p> <p>17. Describes the exceptional circumstances in which the regulations on the discharge of oil or oily mixtures do not apply.</p> <p>18. States that ballast water should not normally be carried in cargo tanks of tankers provided with segregated ballast tanks.</p> <p>19. Explains the exceptions in which ballast may be carried in cargo tanks – states that every oil tanker operating with crude oil washing systems should be provided with an Operations and Equipment Manual.</p> <p>20. States that, in new ships of 400 tons gross tonnage and above and in new oil tankers of 150 tons gross tonnage and above, no ballast water should normally be carried in any oil fuel tank.</p> <p>21. Explains that a new chapter 8 – STS operations has been added to MARPOL Annex 1 to prevent marine pollution during some ship-to-ship (STS) oil transfer operations.</p> <p>22. States that as per the above amendment to Annex I of MARPOL, Tankers of 150 GT and above involved in STS operations are required to have on board by the date of the first periodical survey after 1 January 2011 (but not later than 1 April 2012) an STS operations plan approved by the ship flag Administration, describing how STS operations are to be conducted.</p>	
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Annex II – Noxious Liquid Substances in Bulk

1. Describes the requirements of Annex II apply to all ships carrying noxious liquid substances in bulk.
2. States that noxious liquid chemicals are divided into four categories, X, Y, Z and OS such that substances in category X pose the greatest threat to the marine environment and those in category Z the least.
3. States that the conditions for the discharge of any effluent containing substances falling in those categories are specified.
4. states that more stringent requirements apply in

	<p>special areas, which for the purposes of Annex II are the Antarctic area.</p> <ol style="list-style-type: none"> 5. States that pumping and piping arrangements are to be such that, after unloading, the tanks designated for the carriage of liquids of categories Z do not retain more than certain stipulated quantities of residue. 6. States that the discharge operations of certain cargo residues and certain tank cleaning and ventilation operations may only be carried out in accordance with approved procedures and arrangements based on standards developed by IMO. 7. States that each ship which is certified for the carriage of noxious liquid substances in bulk should be provided with a Procedures and Arrangements Manual. 8. States that the Manual identifies the arrangements and equipment needed to comply with Annex II and specifies the operational procedures with respect to cargo handling, tank cleaning, slops handling, residue discharging, ballasting and deballasting which must be followed in order to comply with the requirements of Annex II. 9. States that each ship should be provided with a Cargo Record Book which should be completed, on a tank-by-tank basis, whenever any operations with respect to a noxious liquid substance take place. 10. States that a surveyor appointed or authorized by the Government of a Party to the Convention to supervise any operations under this Annex should make an appropriate entry in the Cargo Record Book. 11. Describes the surveys required for ships carrying noxious liquid substances in bulk. 12. States that the certificate issued on satisfactory completion of the survey is an international Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk. <p>Annex III – Harmful Substances Carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons</p> <ol style="list-style-type: none"> 1. States that for the purpose of this Annex, empty receptacles, freight containers and portable road 	
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	<p>and rail tank wagons which have been used previously for the carriage of harmful substances are treated as harmful substances themselves unless precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment.</p> <ol style="list-style-type: none"> 2. States that packaging, containers and tanks should be adequate to minimize hazard to the marine environment. 3. Describes the requirements for marking and labelling packages, freight containers, tanks and wagons. 4. Describes the notification procedures for loading/unloading harmful substances as per MARPOL Annex III. 5. Describes the documentation relating to the carriage of harmful substances by sea – states that certain harmful substances may be prohibited for carriage or limited as to the quantity which may be carried aboard any one ship. 6. States that jettisoning of harmful substances is prohibited except for the purpose of securing the safety of the ship or saving life at sea. 	
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Annex IV – Sewage

1. States that Annex IV contains a set of regulations regarding the discharge of sewage into the sea, ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification.
2. Describes the provisions regarding the discharge of sewage into the sea – states that an International Sewage Pollution Prevention Certificate is issued by national shipping administrations to ships under their jurisdiction showing compliance.
3. States that the Annex requires ships to be equipped with either a sewage treatment plant or a sewage comminuting and disinfecting system or a sewage holding tank.
4. States that the discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land; or

	<p>is discharging sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land.</p> <p>Annex V – Garbage</p> <ol style="list-style-type: none"> Defines, for the purposes of Annex V: – garbage – nearest land – special area States that the provisions of Annex V apply to all ships States that the disposal into the sea of all plastics is prohibited States the regulations concerning the disposal of other garbage. States that the special areas for the purposes of Annex V. <p>Annex VI – Air Pollution</p> <ol style="list-style-type: none"> Defines, for the purposes of Annex VI: continuous feeding, emission control area (ECA), new installations, nitrogen oxide (NOX) technical code, ozone-depleting substances, sludge oil, shipboard incineration, shipboard incinerator, particular matter (PM), volatile organic compounds (VOCs) Describes the types of inspection required under Annex VI Describes the provision for the issuance of Certificates under Annex VI. Describes the duration of validity of the certificates Describes the regulation regarding NOx in regulation 13 of Annex VI Describes the requirement for SOx emission control area (SECA) Describes the requirement for fuel oil quality in regulation 18 of Annex VI Describes the requirements of EEXI, SEEMP and EEDI under Chapter 4. States that the special areas for the purposes of Annex VI <p>Conventions and legislations adopted by various countries (4 HRS).</p> <p>The trainee is expected to have a basic working knowledge of the conventions and legislations adopted by various countries such as, but not limited to:</p> <ol style="list-style-type: none"> Merchant Shipping Act, 1958. Convention of the Prevention of Marine Pollution by Dumping of Waste and Other Matter (London Dumping Convention) (LDC). 	
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	<ol style="list-style-type: none"> 3. International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969. 4. International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC 1969). 5. Oil Pollution Preparedness, Response & Cooperation Convention (OPRC) as amended (OPRCHNS Protocol). 6. OPA-90 and other US legislation 	
Anti-Pollution Procedures and Associated Equipment	<p>Control of discharge of oil (1hrs)</p> <ol style="list-style-type: none"> 1. Explains the control of discharge of oil as stated in regulation 9 of MARPOL 73/78 2. Explains Particularly Sensitive Sea Areas (PSSA) 3. Explains methods for prevention of oil pollution and discharge provisions for oil and oily waste from machinery spaces outside special areas and within special areas. 4. Explains bilge water holding tank – explains oily water separator 5. Explains oil discharge monitoring and control system and oil filtering equipment as stated in regulation 16 of MARPOL 73/78. 6. Explains in brief the prevention of oil pollution as stated in regulation 13F in the event of collision or stranding and regulation 13G in the event of collision or stranding measures for existing tankers of MARPOL 73/78. 7. Explains the retention of oil on board as stated in regulation 15 of MARPOL 73/78 <p>Oil Record Book (Part I – Machinery Space Operations) and Part II – Cargo/Ballast operations): (1 hr)</p> <ol style="list-style-type: none"> 1. Describes the requirements for the provision of Oil Record Books, which is, oil tankers of 150 tons GT and every ship of 400 tons GT and above other than an oil tanker to carry an Oil Record Book Part I (Machinery space operations). 2. Describes that every oil tanker of 150 tons GT and above shall also be provided with an Oil Record Book Part II (Cargo/ballast operations). 3. Describes the various operations when the Oil Record Book has to be completed – lists the various entries that need to be made in the Oil Record Book with respect to above for following operations: for machinery space operations (all ships); for cargo/ballast operations (oil tankers). 	8 hours

	<p>4. Describes the entries required for accidental or other exceptional discharge of oil.</p> <p>5. Explains that each completed operation shall be signed by the officer or officers in charge of the operations concerned and each completed page shall be signed by the master of ship.</p> <p>6. States that the Oil Record Book should be kept on board readily available for inspection and should be preserved for a period of three years after the last entry has been made.</p> <p>7. Explains that the competent authority of the Government of a Party to the Convention may inspect the Oil Record Book on board any ship to which Annex I applies while the ship is in its port or offshore terminals and may make a copy of any entry in that book and may require the master of the ship to certify that the copy is a true copy of such entry.</p> <p>Shipboard Oil Pollution Emergency Plan (SOPEP) including Shipboard Marine Pollution Emergency Plans (SMPEP) for Oil and/or Noxious Liquid Substances and Vessel Response Plan (VRP): 1 hrs.</p> <ol style="list-style-type: none"> 1. States that the Shipboard Oil Pollution Emergency Plan ("SOPEP") is to be seen as an information from the owners to the Master of a particular ship. 2. States it is an advice to the Master how to react in case of an oil spill to prevent or at least mitigate negative effects on the environment. 3. States that the Plan contains operational aspects for various oil spill scenarios and lists communication information to be used in case of such incidents. 4. States that it is compulsory for all ships of more than 400 gross tons (oil tankers of more than 150 GT) to carry a SOPEP on board. 5. States that the required contents is described in MARPOL Convention Annex I, reg. 26 6. Explains that "Guidelines for the Development of a Shipboard Oil Pollution Emergency Plan" are published by IMO under MEPC.54(32) 1992 as amended by MEPC.86(44) 2000. 7. States that the SOPEP forms an integral part of the IOPP certificate and its existence is verified in the Supplement to the IOPP Certificate. 8. Describes that the Plan consists generally of 4 	
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	<p>sections with the mandatory contents and its appendices with additional information as contact addresses and data plus a set of certain drawings for easy reference for the Master.</p> <ol style="list-style-type: none"> 9. Describes that the SOPEP consists of the following chapters: Ship identification data; Table of Contents; Record of Changes; Section 1: Preamble; Section 2: Reporting Requirements; Section 3: Steps to control Discharges; Section 4: National and Local Coordination. 10. Minimum Appendices: List of Coastal State Contacts; List of Port Contacts; List of Ship Interest Contacts. 11. Ship's drawings: General Arrangement Plan; Tank Plan; Fuel Oil Piping Diagram. 12. Further appendices on owners' decision. 13. Explains that according to MARPOL following appendices should be added to the SOPEP: (a) Coastal State Contacts (as annually published but quarterly updated in the Internet by IMO); (b) Blank form for listing of Port Contact Addresses to be kept up-to-date by the Master; (c) Ship Interest Contact List (communication data incl. 24hours contact phone numbers to owners/managers, data abt. charterer, insurance, P&I Club, etc.) <p>Shipboard Marine Pollution Emergency Plan (SMPEP)</p> <ol style="list-style-type: none"> 1. Explains IMO has adopted a requirement for ships above 150 GRT certified to carry noxious liquid substances in bulk and that these ships shall carry an additional emergency plan called "Shipboard Marine Pollution Emergency Plan for noxious liquid substances" 2. Explains that this plan is to be seen as an information from the owners to the Master of a particular ship advising the Master how to react in case of a spill of noxious liquid substances to prevent or at least mitigate negative effects on the environment 3. Explains that the Plan is compulsory since 1 January 2003 4. Describes that the Plan contains operational aspects for various spill scenarios and lists communication information to be used in case of such incidents 5. Explains that as the contents is mainly similar to 	
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	<p>the contents of the Shipboard Oil Pollution Emergency Plan (SOPEP) which is compulsory, IMO recommends to prepare a combined plan called "Shipboard Marine Pollution Emergency Plan" ("SMPEP").</p> <ol style="list-style-type: none"> 6. Explains that such plan has to fulfil the requirements for the SOPEP and additionally for the Shipboard Marine Pollution Emergency Plan for noxious liquid substances according to the IMO Guideline. 7. States that the required contents is described in MARPOL 73/78 as amended Annex II, Reg. 16. 8. Explains that "Guidelines for the Development of a Shipboard Marine Pollution Emergency Plan for noxious liquid substances" are published by IMO under MEPC.85(44) adopted in March 2000. 9. Explains that the Certificate of Chemical Fitness or Substances in Bulk respectively can only be issued if the said plan is available on board. 10. Explains that If a combined plan "Shipboard Marine Pollution Emergency Plan" (SMPEP) is carried, it has to be in accordance with the guidelines MEPC.85(44) and MEPC.54(32) as amended by MEPC.86(44) <p>Vessel Response Plan (VRP)</p> <ol style="list-style-type: none"> 1. Explains that the VRP 2. Vessel Response Plan is a plan required for vessels trading to/from/in USA and this US Coast Guard's new regulations to improve pollution-response preparedness for vessels carrying or handling oil upon the navigable waters of the United States came into effect from 22 February 2011 3. Explains that the Oil Pollution Act of 1990 (OPA-90) and the international treaty, MARPOL 73/78, require owners/operators of certain vessels to prepare Vessel Response Plans (VRP) and/or Shipboard Oil Pollution Emergency Plans (SOPEP) and in addition, for certain vessels carrying noxious liquid substances a Shipboard Marine Pollution Emergency Plan (SMPEP), effective from 1 January 2003. <p>Operating procedures of anti-pollution equipment, sewage plant, incinerator, comminutor, ballast water treatment plant: 1 hr</p> <ol style="list-style-type: none"> 1. Describes the operating procedures of anti- 	
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	<p>pollution equipment such as: sewage plant, incinerator, comminutor, ballast water treatment plant</p> <p>Volatile Organic Compound (VOC) Management Plan, Garbage Management System, Anti-fouling systems, Ballast Water Management and their discharge criteria (4 hrs)</p> <p>Volatile Organic Compound (VOC) Management Plan</p> <ol style="list-style-type: none"> 1. Describes that Volatile Organic Compounds (VOC) are organic chemicals that easily vaporize at normal conditions and enter into the atmosphere 2. Explains that VOC may include a very wide range of individual substances, such as hydrocarbons (e.g. methane, ethane, benzene, toluene, etc.), oxidized hydrocarbons (or fuel oxygenates, such as methyl tert-butyl ether (MTBE)) and by-product organic compounds from chlorination in water treatment (such as chloroform) 3. Explains that VOC emissions from the fuel/petroleum industry sources occur during extraction of oil at the platform, tanker transportation of oil, loading and discharging at terminals, oil processing at refineries, tanking at filling stations and leakage from pipelines as well as oil spills 4. Explains that VOC emissions from ships can be due to incomplete combustion processes and include crankcase, exhaust and evaporation emissions. 5. Explains that tankers emit VOC during cargo loading and crude oil washing operations as well as during sea voyages. 6. Explains that the amount of VOC emissions depends on many factors including the properties of the cargo oil, the degree of mixing and temperature variations during the sea voyage. 7. Explains that to control this emission, there are four criteria that impact the extent and rate of evolution of gaseous non-methane VOC from crude oils and its subsequent release to the atmosphere. These are: the volatility or vapour pressure of the crude oil; the temperature of the liquid and gas phases of the crude oil tank; the pressure setting or control of the vapour phase within the cargo tank; the size or volume of the vapour phase within the cargo tank. 	
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	<p>8. Describes that regulation 15.6 of MARPOL requires a tanker carrying crude oil shall have on board and implement a VOC Management Plan (Management Plan) approved by the Administration in accordance with IMO resolution MEPC.185(59) "Guidelines for the Development of a VOC Management Plan"</p> <p>9. Explains that this VOC Management Plan is specific to each ship – explains that the aim of the VOC Management Plan is to identify the arrangements and equipment required to enable compliance with regulation 15.6 of the Revised Annex VI and to identify for the ship's officers the operational procedures for VOC emission control.</p> <p>Garbage Management Plan</p> <ol style="list-style-type: none"> Explains that as per MARPOL 73/78, Annex V, regulation 9 every ship of 400 gross tonnage and above and every ship which is certified to carry 15 persons or more are to be required to carry a Garbage Management Plan which the crew are required to follow. Describes the content of the Garbage Management Plan. <p>Garbage Record Book</p> <ol style="list-style-type: none"> Explains that every ship of 400 gross tonnage and above and every ship which is certified to carry 15 persons or more engaged in voyages to ports or offshore terminals under the jurisdiction of other Parties to the Convention and every fixed and floating platform engaged in exploration and exploitation of the seabed are to be provided with a Garbage Record Book. Describes the various operations when the Garbage Record Book has to be completed – lists the various entries that needs to be made in the Garbage Record Book. Explains the disposal criteria for cargo residues/cargo hold washing water residues. <p>Anti-fouling systems</p> <ol style="list-style-type: none"> States that IMO adopted a new International Convention on the Control of Harmful Anti-fouling Systems on Ships, on 5 October 2001 which will prohibit the use of harmful organotins in anti-fouling paints used on ships and will establish a mechanism to prevent the potential future use of 	
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	<p>other harmful substances in anti-fouling system.</p> <ol style="list-style-type: none"> 2. States that the convention entered into force on 17 September 2008. <p>Ballast Water Management Convention 2004</p> <ol style="list-style-type: none"> 1. States that The International Convention for the Control and Management of Ships Ballast Water & Sediments (BWM convention) was adopted by consensus at a diplomatic Conference at IMO in London on Friday 13 February 2004 and expected to be ratified. 2. Defines the following: ballast water, ballast water management, sediments. 3. Describes the application of this convention 4. States that in order to show compliance with the requirements of the Convention each vessel shall have on board a valid Certificate, a Ballast Water Management Plan and a Ballast Water Record Book. 5. Describes the conditions where the application of this convention may be exempted. 6. Describes the management and control requirement based on Section B Regulation B1 to B6. 7. Describes the Annex – Section A, B, C, D and E briefly. 8. Describes the various methods of ballast exchange. 9. Describes the standards that need to be observed in ballast water exchange. 10. States under regulation B-4 Ballast water exchange, all ships using ballast water exchange should: (a) whenever possible, conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, taking into account Guidelines developed by IMO & (b) in cases where the ship is unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth. 11. States as per Annex – Section B Management and control requirements for ships: ships are required to have on board and implement a Ballast Water Management Plan approved by the Administration (regulation B-1). The Ballast Water Management 	
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	<p>Plan is specific to each ship and includes a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices.</p> <p>12. States that a new paragraph, 4, has been added with effect from July 1, 2010 to SOLAS chapter V, regulation 22 – Navigation bridge visibility. Some changes are operational and others introduce new requirements applicable to navigation records.</p> <p>13. States that as a consequence of this amendment, any increase in blind sectors or reduction in horizontal fields of vision resulting from ballast water exchange operations is to be taken into account by the Master before determining that it is safe to proceed with the exchange.</p> <p>14. States that as an additional measure, to compensate for possible increased blind sectors or reduced horizontal fields of vision, the Master must ensure that a proper lookout is maintained at all times during the exchange. Ballast water exchange must be conducted in accordance with the ship's ballast water management plan, taking into account the recommendations adopted by the IMO.</p> <p>15. Explains that in accordance with SOLAS chapter V, regulation 28 – Records of navigational activities and daily reporting, the commencement and termination of the operation should be recorded.</p> <p>16. Explains that the navigational records generated during ballast water exchange may be reviewed during ISM Audits and port State control inspections.</p>	
Proactive Measures to Protect Marine Environment	<p>Importance of proactive measures to protect the marine environment</p> <ol style="list-style-type: none"> Explains the need for taking proactive measures to protect the marine environment. Describes the proactive measures that can be taken on board the ships to protect the marine environment for shipboard operations, including: <ul style="list-style-type: none"> (a) bunkering; (b) loading/discharging oil; (c) chemicals and hazardous cargoes; (d) tank cleaning; (e) cargo hold washing; (f) pumping out bilges (hold and engine-room); (g) ballast water exchange; (h) purging and gas freeing; (i) disposal 	4 hours

	of other garbage; (j) discharge of sewage	
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Total No of Hours: 77 Hours

Bridge Course 2

(For fulfilling gaps in education and training for Class II FG CoC under Regulation III/2)

Annexure 16: Part A of the DGS Order 17 of 2022

Topic	Syllabus	Number of Hours.
Function: Marine Engineering Knowledge General		
Technology of materials	<ol style="list-style-type: none"> Engineering processes used in Construction and Repairs. New materials / welding techniques Latest trends. 	3 hours
Physical & chemical properties of fuel & lubricants	<ol style="list-style-type: none"> Production of Oils from Crude Oil, Properties and characteristics of fuels and lubricants. Shore side and shipboard sampling and testing, Interpretation of test results, Contaminants including microbiological infection, Treatments of fuels and lubricants including storage, centrifuging, blending, pretreatment and handling. 	9 hours
Start Up and Shut down of Auxiliary Machinery	<ol style="list-style-type: none"> Safe and efficient operation, Surveillance & Performance assessment of electrical machines and systems. Operation and testing of pneumatic hydraulic and electric control systems. Operation of cargo handling equipment and deck machinery. 	13 hours
Total Function Hours		25 hours
Function: Marine Engineering Knowledge Motor		

Start up and Shut down main and auxiliary machinery, including associated systems	Engine components <ol style="list-style-type: none"> Explain out of balance gas and inertia forces, couples, and moments, and relate these to flywheels, balance weights, and first/second order balancing, and hull vibration. Evaluate the calibration of: Pistons, cylinder liners, piston rings, bearings, crankshafts, to identify wear patterns, limits, and means of correction Specify alignment and adjustment criteria of: Crankshafts, chain drives, gear drives, integral thrust bearings, crossheads 	15 hours
	Fuel Injection <ol style="list-style-type: none"> Describe, with the aid of simple sketches, the difference between constant and variable injection timing of fuel, showing materials, principal parts, and methods of operation and adjustments of common types of fuel pump. Compare injection requirements for slow speed, medium speed, and high speed diesel engines, including pilot injection and pre-combustion chambers. Explain, using relevant diagrams and stating normal operating parameters: Fuel valve cooling arrangement and Uni-fuel and dual-fuel systems (for high/medium viscosity fuel types) Discuss the atmospheric pollution aspects of diesel engine combustion, and give methods which reduce this pollution (especially SOx and NOx reduction). 	5 hours
	Starting and Reversing <ol style="list-style-type: none"> Compare the different methods of utilizing diesel engines for ship propulsion, including - Direct coupled, reversible slow and medium speed engines and Clutched and geared reversible and unidirectional medium speed engines with a fixed pitch propeller, Clutched and geared reversible and unidirectional medium speed engines with a controllable pitch propeller, and Diesel electric drive. 	3 hours
	Cooling systems <ol style="list-style-type: none"> Analyze the problems that may arise in cooling water spaces of diesel engines. Evaluate common methods of diesel engine 	3 hours

	<p>cooling water treatment.</p> <ol style="list-style-type: none"> 3. State the importance of maintaining diesel engine thermal efficiency and evaluate thermal loads on engine components. 4. Justify cooling media selection and state the advantages and disadvantages of various diesel cooling methods. 5. Evaluate the tests used in the control of diesel engine cooling water treatment. 6. Explain, using relevant diagrams and stating normal operating parameters, typical methods of cooling: Medium and slow speed diesel engine pistons, Exhaust valves, Cylinders, Turbochargers, Cylinder heads. 	
	Diesel Engine Control and Safety	3 hours
	Diesel Engine Emergency Operation	3 hours
	Multi-engine Propulsion Arrangement	3 hours
Total Function Hours:		35 hours
Function: Marine Electro Technology		
Design features and system configuration of automatic control equipment and safety devices	<p>General Requirements</p> <ol style="list-style-type: none"> 1. Angles of heel and trim at which machinery should be capable of operating. 2. Effect of temperature changes on - Electromagnetic devices, Generator voltage. 3. Axis of a rotating machine should not be placed athwart ships unless so designed. 	1 hours
Design features and system configuration of automatic control equipment and safety devices	<p>Main Engine</p> <ol style="list-style-type: none"> 1. Tuning - System response. Control loop tuning. Ziegler-Nichols, Cohen-Coon tuning methods. 2. Final Control Elements - Control valve trim. Selecting control valves and their actuators. Valve sizing. 3. Electronic PID Controllers - Single loop digital controllers. Manual and automatic tuning of electronic controllers. 4. UMS Systems - Concept of Unattended Machinery Spaces (UMS). Requirements of UMS. Bridge control. Testing regime for UMS. 5. Software version control, construction and use of computer network on ships for bridge-based, engine room-based and commercial applications. 	1 hours
Design features and system configuration of automatic control equipment and	<p>Generator and distribution system:</p> <ol style="list-style-type: none"> 1. Instrumentation and Safety in Generator and Distribution system, 2. Automatic Starting of Propulsion Auxiliaries 	6 hours

safety devices		
Design features and system configuration of operational control equipment for electrical motors	<p>Three Phase A.C. Motors –</p> <ol style="list-style-type: none"> 1. Construction, 2. Principle of operation of 3-phase induction motors 3. Design features of star and delta motors, 4. Starting, 5. Speed controlling and braking methods of 3-phase induction motors. 6. Load-torque characteristics and protection 	12 hours
	<p>Three Phase Synchronous Motors –</p> <ol style="list-style-type: none"> 1. Construction. 2. Principle of operation. 3. Load characteristics 4. Power factor improvement with synchronous motors. 	3 hours
	<p>Effect of varying frequency and voltage of A.C. Motors:</p> <ol style="list-style-type: none"> 1. Speed, Temperature, Torque, Power output and Starting time, Current. 	3 hours
	<p>Motor control and protection:</p> <ol style="list-style-type: none"> 1. D. C. Motors; A. C. Motors 	6 hours
	<p>Insulated Gate Bipolar Transistor (IGBT) motor speed control:</p> <ol style="list-style-type: none"> 1. Gate driving characteristics with high current. 2. High frequency. 3. High current switch. 4. Advantages of IGBT in varying motor speed control. 	3 hours
	<p>Motor speed control by Thyristors:</p> <ol style="list-style-type: none"> 1. Application of thyristors in motor speed control 	3 hours
	<p>Three Phase Generators:</p> <ol style="list-style-type: none"> 1. Construction. 2. Salient and cylindrical rotor types, 3. Shaft generators, 4. Excitation methods, 5. Automatic voltage regulation, 6. Synchronization, 7. Parallel operation, 8. Generator trouble shooting. 	6 hours
	<p>Three Phase Transformers:</p> <ol style="list-style-type: none"> 1. Construction Polarity. 2. Configurations in Star and Delta combinations. 3. Open delta configuration. 	6 hours
Electronics, Power	Semiconductor Devices:	6 hours

Electronics	<p>Integrated Circuits –</p> <ol style="list-style-type: none"> 1. Ideal operational amplifier, characteristics, types, mounting methods and markings, advantages of ICs. 2. Practical operational amplifier, circuit configurations, CMRR, instrumentation amplifier, 4-20mA circuit. 3. Voltage regulators, multi-vibrators. 4. IC applications and common circuits. 5. Data sheets. <p>Electronic Fault Diagnosis –</p> <ol style="list-style-type: none"> 1. Interpretation and use of electronic systems and subsystem circuit diagrams, operation and maintenance manuals. 2. Electronic test equipment, method of DMM display. 3. Use of CRO as a testing and display instrument. 4. Analysis of measurement and test result on components and circuits. 5. Methods of fault detection. 	
High Voltage Systems	<ol style="list-style-type: none"> 1. Design features, operational and safety Requirements for marine HV system. 2. Mandatory rules for HV system in safe and Flammable areas and with/ without earthing. 3. Carrying out switching and isolation procedure 	3 hours
Management of Trouble shooting and restoration of electrical and electronic equipment to operating conditions	<p>Control System & Troubleshooting:</p> <ol style="list-style-type: none"> 1. Troubleshooting of electrical and electronic control equipment - Electrical safety, Test equipment, Interpretation of circuit symbols, Logical six step trouble shooting procedure, Generation, Prime mover electrical control, Main air circuit breaker, Protection of generators, Electrical distribution systems, Motors, Electrical survey requirements, Calibrate and adjust transmitters and controllers, Control system fault finding. 2. Function test of electrical. Electronic control equipment and safety devices. 3. Troubleshooting of monitoring systems - Test and calibration of sensors and transducers of monitoring system. 4. Software version control - Programmable logic controllers (PLC), Microcontrollers, Digital techniques. 	3 hours
Management of Trouble shooting and restoration of electrical and electronic equipment	<p>Maintenance & repair of the following:</p> <ol style="list-style-type: none"> 1. Electrical and electronic systems operating in flammable areas, Carrying out safe maintenance and repair procedures, Detection of machinery malfunction, location 	3 hours

to operating conditions	of faults and action to prevent damage	
	Total Function Hours	65
Function: Marine Engineering Practice		
Theory of maintenance	<p>Theoretical knowledge of Marine engineering practice and maintenance of machinery.</p> <p>Methods of dealing with wear and tear of machinery, both electrical and mechanical. Alignment of machinery components. Correction of defects.</p> <p>Detection of machinery malfunction, location of faults and action to prevent damage - Unplanned maintenance. Temporary or permanent repairs in the event of breakdown:</p> <ul style="list-style-type: none"> - Failure of cross-head bearing/ main bearing/ bottom end bearings of main engine. - Breakage of chain drives of main engine. - Breakdown on turbo chargers. - Breakdown of main air conditioning and fridge system. - Collapse/ failure of multiple boiler water tubes. 	39 hours
Practice of Maintenance	<ol style="list-style-type: none"> 1. Management and conduct of ship maintenance by planned maintenance and preventive maintenance as per ISM Code. Theory of condition monitoring and its application onboard ships. Principles of tribology and its practices. 2. Planning and execution of dry docking and other major repairs. Manageable breakdowns and emergency repairs. 3. Planning and execution of safe maintenance activity and repair procedures taking into account technical, legislative, safety procedural specification, appropriate plan, specification of materials and equipment available for maintenance and repairs. 4. Risk assessment and evaluation before commencement of maintenance activity. 5. Destructive and non-destructive testing. 6. Major contamination of main L.O. sump – Action/ handling/ rectification. 7. Severe flooding of engine room bilges – Action/ handling/ rectification. 8. Trials and restoration of the plant after 	15 hours

	repairs. Safe working practices. 1. Inspection and Adjustment of Equipment relevant to Marine Engineering.	
Marine Engineering practice: Theoretical & Practical Knowledge	2. Classification society and class certificates, 3. Statutory certification of ships, 4. Surveys for maintenance and renewal of class and statutory certificates.	3 hours
Total Function Hours		57 Hours
Function: Ship Construction and Naval Architecture		
Structural strength	1. Hydrostatics, density, relative density, pressure on an immersed plane, center of pressure, load diagram, shearing force on bulkhead stiffeners. 2. Displacement, TPC, Coefficients of Form, wetted surface area, similar figures, shearing force and bending moment. 3. Calculation of area, volume, first and second moments, Simpson's rules, use of intermediate ordinates	9 hours
Transverse stability	1. Centre of Gravity, effect of addition/removal of masses, effect of movement of masses, suspended mass. 2. Transverse Stability, calculation of BM, Metacentric diagram, inclining experiment, free surface effect, stability at large angles of heel, cross curves of stability, Angle of Loll stability of wall sided vessel.	9 hours
Trim or Longitudinal stability	1. Longitudinal BML and GML, Centre of flotation and its calculation. Moment to change trim by one centimeter. 2. Trim: Changes due to adding or removing fuel, ballast or cargo. Changes due to alteration in density of sea water. Changes due to bilging of compartments, using the Lost Buoyancy and Added Mass methods. Dynamical Stability, SOLAS, ILLC Convention requirement, 3. Forces on rudder and stress in rudder stock. Heel when turning, including effect of centrifugal force and of force on rudder. 4. Factors affecting trim and stability and measures necessary to preserve trim and stability. Effect on trim and stability of a ship in the event of damage to, and consequent flooding of, a compartment and countermeasures to be taken. IMO	9 hours

	recommendations concerning ship stability.	
Resistance and propulsion	<p>1. Resistance and propulsion. Resistance and Fuel Consumption, Propeller and Power, Rudders & Damage Control. Various Types of resistance, Geometry of Propeller, The law of corresponding speeds. Froude's law of comparison. Simple problems on the prediction of full scale resistance from model experiments. Elementary treatment of propeller and simple problems on pitch, pitch ratio, apparent slip, wake velocity, Thrust and Power. Bulbous Bow, Sea trials and interpretation of data recorded. Effects of fouling.</p> <p>2. Drag and Lift of Propeller, Problems on propellers involving the use of wake factor, Effective Power, Delivered Power, Propulsive & Quasi Propulsive coefficient, Propeller efficiency, Bollard Pull, Computation of thrust and Power, Cavitation No, Cavitation Tunnel test of Model propeller, Correlation between Model and Full Propeller, Vibration in ships.</p> <p>3. Ducted Propeller, Voith Schneider Propeller, Water Jet Propulsion.</p> <p>4. Factors affecting trim and stability and measures necessary to preserve trim and stability. Effect on trim and stability of a ship in the event of damage to, and consequent flooding of, a compartment and countermeasures to be taken. IMO recommendations concerning ship stability.</p>	12 hours
Ship Construction	<p>1. Fundamental principles of ship construction and measures necessary to preserve trim and stability, Nomenclature of ship parts, Ship Types and Terms, Stresses in Ship Structures, Ship Dynamics, Hydrostatics, Displacement, Stability during dry docking and stability during grounding, Forces on ship under various conditions, including the effect of panting and pounding. Construction of all parts of steel ships. Use of high tensile steel and aluminum.</p> <p>2. Structural fire protection arrangements. Dry docking. Design features of ships for general and specialized trades.</p> <p>3. Life saving equipment Operation and handling gear for lifeboats and life rafts. Ship measurement and classification. Meaning of 'classed' and 'unclassed' ships. Common terms used in measurement of modern steel</p>	21 hours

	ships. Common terms used in tonnage measurement e.g. gross tonnage, net tonnage.	
	Total Function Hours	60 hours
Function: SHIPS SAFETY, ENVIRONMENTAL PROTECTION & PERSONAL CARE		
Legislative requirements and measures to ensure safety of life at sea and protection of the marine environment	<ol style="list-style-type: none"> Knowledge of relevant International Maritime Law embodied in international agreements and conventions - United Nations Convention on the Law of Sea (UNCLOS), International Maritime Organization (IMO), World Health Organization (WHO), Introduction to International Labour Organization (ILO), Treaties, conventions, protocols, rules and regulations, List of IMO Conventions & Authorities & Regulations. National Legislation for implementing International agreements and Conventions. 	6 hours
	<ol style="list-style-type: none"> Certificates and other documents to be carried on board ships by international conventions (as per SOLAS Annex 1) and how they may be obtained and period of their legal validity. Responsibilities under the relevant requirements of the international convention on load lines. Responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea - Brief description of International Convention for the Safety of Life at Sea, Obligation - to carry out surveys and maintain validity of certificates, to maintain records and rights of master. Responsibilities under the relevant requirements of the International Convention for the Prevention of Pollution from Ships - Annex I, Annex II, Annex III, Annex IV, Annex V, Annex VI. 	6 hours
	<ol style="list-style-type: none"> Maritime declarations of Health and the requirements of the International Health Regulations – WHO's International Health Regulations 2005 (IHR), WHO's Guidelines for drinking water quality, International Medical Guide for ships (IMGS) and IMO's Medical First Aid Guide (MFAG) 	12 hours

	<ol style="list-style-type: none"> 2. Responsibilities under International Instruments Affecting the Safety of the Ships, Passengers, Crew or Cargo: ILO's Maritime Labour Convention 2006 (MLC 2006) 3. Convention on the International Regulation for Preventing Collisions at Sea (COLREG) 1972 4. International Convention on Salvage 1989; Lloyd's Standard Form of Salvage Agreement (LOF 2000) 5. Convention on Limitation of Liability of Maritime Claims 1976 6. International Convention for the unification of certain rules of law relating to Bills of Lading (Hague-Visby Rules) 7. Charter parties 8. Marine Insurance, General Average and P & I Club 	
Legislative requirements and measures to ensure safety of life at sea and protection of the marine environment	<ol style="list-style-type: none"> 1. Methods and aids to prevent pollution of the environment by ships 2. List of Conventions, Sources of Marine Pollution, Effects of Marine oil spills and Noise 3. International Convention for the Control and Management of Ship's Ballast Water and Sediments 4. International Convention for the Control of Harmful Anti-Fouling Systems on Ships (AFS) 2001 5. Regulations for prevention of oil pollution as per Annex I of 73/78 6. Regulations for control of pollution from noxious liquid substances carried in bulk as per Annex II of MARPOL 73/78 7. Regulations for the Prevention of Pollution by harmful substances carried by sea in packaged form as per Annex III of MARPOL 73/78 8. Requirements covering the carriage of dangerous goods by sea as per Chapter VII of the SOLAS Convention 9. Regulations for the Prevention of Pollution by Sewage from Ships as per Annex IV of MARPOL 73/78 10. Regulations for the Prevention of Pollution by Garbage from Ships as per Annex V of MARPOL 73/78 11. Regulations for the Prevention of Air Pollution as per Annex VI of MARPOL 73/78. 	15 hours
Safety and security of	1. Life Saving Appliances Regulations (SOLAS) -	6 hours

the vessel, crew and passengers	<p>Life-Saving appliances and arrangements (Chapter III of SOLAS) and Life-Saving Appliance Code.</p> <ol style="list-style-type: none"> 2. Organization of fire and abandon ship drill. 3. Maintenance, functions and use of Life Saving Appliances, Fire-Fighting and other safety systems. 4. Actions to protect and safeguard all persons on board in emergencies; rescue of persons from a vessel in distress or from a wreck; and Man-overboard procedures. 5. Action and means to limit damage and save the ship following fire, explosion, collision or grounding – Contingency plans for response to emergencies and Procedures for abandoning ship. 	
Use Leadership and Managerial Skills	<ol style="list-style-type: none"> 1. Knowledge of International Maritime Conventions and recommendations and related National Legislations - The ISM Code, STCW Convention, ILO's MLC 2006. 	5 hours
Total Function Hours		50 hours

Total No of Hours : 292 Hours

Bridge Course 4

(For Officer in-charge of an Engineering Watch NCVShips of less than 3000 KW Propulsive Power under Regulation III/1)

Annexure 17: Part A of the DGS Order 17 of 2022

Function: Marine Engineering Knowledge		
Competence	Syllabus	Hours
Machineries of Engine Room Including Main Engine and Auxiliary machineries	<ol style="list-style-type: none"> 1. Familiarization of Main and Auxiliary Machinery (preparation for operation) 2. Auxiliary Engine - Working principles and constructional features of auxiliary prime movers used for alternators 3. Boiler - Lists the different uses of steam, Use of package boiler on board ship, Pressure range in auxiliary boiler, Boiler operation – raising steam, shutting down, and Preliminary requirement to maintain feed water. Different parts – boiler mountings. Methods of checking water level in steam boilers and necessary action taken if water level is abnormal. 	15 hours
Function: Ship Safety and Environmental Protection		
Environmental Protection – preventive and proactive measures	<ol style="list-style-type: none"> 1. Pollution Prevention - Basic knowledge 2. Prevention of pollution of the marine environment, anti-pollution procedures and precautions. 3. Effects of operational or accidental pollution on Marine environment. 4. Familiarity with all annexes of MARPOL. 5. Anti-pollution equipment & anti- pollution drills. 6. Familiarity with SOPEP manual and Oil Record Book. 7. Working principles of incinerator. 8. Working principles of sewage treatment plant 	8 hours
Naval Architecture and Stability	<ol style="list-style-type: none"> 1. Density, relative density, pressure exerted by a liquid load on an immersed plane, c.o. pressure. The meaning of the terms Block co-efficient, Displacement, Dead weight, Laws of floating bodies, Use of displacement and TPC Immersion scales to determine weight of cargo or ballast from draught or freeboard. 2. Effect of density of water on draught or freeboard, Fresh water Allowance. The meaning of the terms 	21 hours

	<p>Buoyancy and Reserve Buoyancy.</p> <p>3. General understanding of centre of gravity. Centre of buoyancy Metacentric height. Righting lever, Righting Moment, Stable, unstable and neutral equilibrium.</p> <p>4. Stiff and Tender Ships. The dangers of slack tanks. Use of stability & Hydrostatic data as supplied to ships.</p> <p>5. The effect of adding and removing weights on ship's centre of gravity, centre of buoyancy".</p>	
Marine Legislation -	<p>1. Basic working knowledge of IMO Conventions:- SOLAS, MARPOL, LOADLINE,STCW and other legislations / instruments applicable to maritime field.</p> <p>2. G.O.I. M.S. Rules concerning maritime and Statutory Certificates to be kept on board issued under various conventions and G.O.I. Rules.</p>	6 hours

Total No of Hours: 50 Hours

Bridge Course 5

(For fulfilling gaps in education and training for Class III-NCV-SEO CoC restricted to ships with propulsive power less than 3000 KW under Regulation III/3)

Annexure 18: Part A of the DGS Order 17 of 2022

Function MARINE ENGINEERING KNOWLEDGE GENERAL		
Competence:	Knowledge, Skills and Proficiency	Number of Hours.
Technology of Materials, properties and characteristics of Metals, Materials, Liquids, Gases and Vapours in machinery on board Ships	<p>Iron and Carbon Family</p> <ol style="list-style-type: none"> 1. The principle difference between steels produced by the open-hearth and the Bessemer processes /Oxygen impingement Method 2. How cast iron is produced 3. The effect of adding carbon to pure iron, ranging from 100% ferrite to 100% cementite 4. The approximate carbon content and uses of: <ol style="list-style-type: none"> a. Mild steel, b. Medium carbon steel, c. High-carbon steel, d. Cast iron. <p>Testing and Properties of Materials / Characteristics:</p> <p>Destructive Tests:</p> <ol style="list-style-type: none"> 1. How Tensile testing of a metal specimen is carried out and reasons for same. 2. The principles of hardness testing. The relative hardness of brass, mild steel, spheroidal graphite cast iron and nodular cast iron 3. The purpose of an impact test. 4. The factors which affect the tendency to brittle fracture / ductile to brittle transition. 5. What is meant by creep /metals affected by creep / creep test /creep cracks. 6. Metal failure due to fatigue. What is meant by fatigue limit / fatigue test –reasons for same. 7. The factors which affect the fatigue limit. 8. The factors which govern the life of a component. 9. The precautions to be taken to avoid fatigue failure. 10. The bend testNon-destructive examination for cracks/ defects within the metal <p>Heat Treatment of Metals:</p> <ol style="list-style-type: none"> 1. In simple terms, what is meant by the upper and lower critical temperature ranges 2. The process and the effect on a medium-carbon 	9 hours

	<p>steel of hardening and tempering</p> <ol style="list-style-type: none"> 3. The purpose and process of annealing 4. The difference between annealing and normalizing and their applications 5. What is meant by work hardening 6. Surface hardening methods 7. Laser hardening <p>Alloying Elements in Irons and Steels</p> <ol style="list-style-type: none"> 1. The principal reasons for adding the following elements: cobalt, nickel. Chromium, molybdenum, The principal vanadium, tungsten, copper, manganese, silicon, titanium <p>Non-ferrous Metals</p> <ol style="list-style-type: none"> 1. Manganese, phosphorus, aluminum & zinc. <p>Non-metallic Materials</p> <ol style="list-style-type: none"> 1. Nitrile rubber; neoprene; P.T.F.E. epoxy resin; rubber; asbestos; cotton; silicon; silicon nitride; glass-reinforced plastics; Composites; Elastomers; Ceramics. <p>Liquids -Properties of Liquids</p> <ol style="list-style-type: none"> 1. Critical Temperature and Critical Pressure. 2. Viscosity is a measure of the resistance to flow. 3. The Structure of Liquids. 4. What Kinds of Materials Form Liquids at Room Temperature? 5. Vapor Pressure 6. Melting Point and Freezing Point. 7. Boiling Point <p>Properties of Gases / VaporsPressure</p> <ol style="list-style-type: none"> 1. Measurement of pressure 2. Temperature 3. Thermal equilibrium and temperature measurements. 4. Gases include CO, N₂, NO, HCl, O₃, HCN, H₂S, CO₂, N₂O, NO₂, SO₂, NH₃, PH₃, BF₃, SF₆, CH₄, C₂H₆, C₃H₈, C₄H₁₀, CF₂Cl₂. 	
CARGO HANDLING EQUIPMENT AND DECK MACHINERY	<p>Power provisions besides steam, electric:</p> <p>Hydraulic drives</p> <ol style="list-style-type: none"> 1. Hydraulic Systems – providing means of distributing power. 2. A typical hydraulic circuit. 3. Hydraulic fluids used. 4. Deterioration / Contamination of oils. 5. Types of pumps used. 6. Types of Hydraulic Motors used. 7. Safeties <p>Electric Power:</p> <ol style="list-style-type: none"> 1. Types of Motors used. 2. The principles of a coil-operated brake suitable for winches and other deck machinery. 3. The application of the Ward-Leonard system to 	3 hours

	<p>the control of deck machinery.</p> <ol style="list-style-type: none"> 4. The basic principles of a Ward-Leonard drive for a deck crane. <p>Steam Drives:</p> <ol style="list-style-type: none"> 1. Reciprocating drives / Steam Generation/ Slide valves/ poppet valves / etc. for reversal of rotary operation. 2. Speed Control. 3. Line circuit to various Winches on Deck, Anchor Windlass, and Mooring Winches. 4. Warming up of lines. 5. Condensate draining. 6. Expansion provision. 7. Materials used for Piping Arrangements. 8. Safety and Braking devices. 9. Insulation / Lagging <p>Deck Machineries</p> <p>Warping Winches and Capstans:</p> <ol style="list-style-type: none"> 1. The purpose and setting of a torque-limit relay in the control system of a warping winch or capstan, including the provision for emergency heavy pulls. 2. The speed variation necessary when handling slack ropes. 3. The possible effect on the generators if direct on-line cage motors are used for winches. 4. The principle of a three-speed cage winch motor, how the cage motor has been applied to windlass operation. 5. The principle of a slip-ring motor drive to a warping winch, including: reversing, overload; torque limiting; speed control; fail-safe braking. 6. Functions and Mechanism of Automatic Control of Cargo Handling Equipment's. 7. The duties of an automatic mooring winch. 8. The principle of the ways in which a grab is operated. <p>DERRICKS AND WINCHES AND CRANES: Equipment's: Derricks, Winches, Wires / Rigging of wires, Pulley blocks / Shackles / Swivel Blocks, Deck Cranes- Jibs. Function of each Actuator</p> <p>Handling:</p> <ol style="list-style-type: none"> 1. What is meant by the luffing and slewing 2. Movements of a crane 3. How dynamic braking is applied to the slewing movement 4. The principle of the union-purchase cargo-handling system and the variations of winch speed required <p>Anchor Windlass</p> <ol style="list-style-type: none"> 1. Anchor Handling. 2. How the speed of lowering is controlled on the 	
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	<p>cable lifter of a windlass.</p> <ol style="list-style-type: none"> 3. The need for the various speeds of a windlass. 4. Housing of Anchors. 5. Chains & Chain Lockers. 6. Locking arrangements for Chain. 7. Hawse pipe / Spurling Pipe / Bow stopper / Brake Arrangement. 	
Oily water separator, incinerator, sewage treatment plant, preparedness for pollution prevention particularly while bunkering	<p>Sewage and Sludge:</p> <ol style="list-style-type: none"> 1. The implications of the International Convention relating to the discharge of sewage 2. A sewage retention system 3. Why vacuum transportation systems are used 4. The processes in a biological treatment plant 5. How the sludge from a biological treatment plant is disposed of 6. Why biological treatment should be kept working continuously 7. Names the contaminants which would impair the treatment process 8. The operation of chemical treatment plants 9. Lists the waste materials that can be incinerated 10. How liquid and solid waste are prepared for <p>Incinerator:</p> <ol style="list-style-type: none"> 1. Types of Incinerators 2. Why Incinerators are used? 3. Marpol Convention – Annex I – Oil Pollution Prevention at Sea /Port 4. Capable of dealing with waste oil, oil-water mixtures, rags, galley waste etc. 5. Operations 6. Component layout 7. Safeties 8. Emission 9. Collection of dry ash from chamber and storage on board / discharge to shore receptacles. <p>Preparedness for Pollution Prevention whilst Bunkering:</p> <ol style="list-style-type: none"> 1. IMO Regulations 2. Port Regulations 3. SOPEP 4. Preplanning 5. Calculations / Safety margin re-capacity 6. Local Agents informed 7. Liaison with Bunker Suppliers 8. Discuss Bunker Procedures / Delivery Rate 	6 hours
Operation and Testing of Pneumatic, hydraulic and Electronic Control Systems.	<p>Operation and Testing of Pneumatic Control Systems:</p> <ol style="list-style-type: none"> 1. Advantage of Control Systems 2. Open Loop and Closed Loop Control Systems 3. Process Control Theory / P+I Controllers , P+I+D Control 4. Signal Transmitting devices / electro –pneumatic 	6 hours

	<p>Converters</p> <ol style="list-style-type: none"> 5. The function of a nozzle-flapper arrangement 6. A proportional controller 7. A two-term controller 8. A three-term controller 9. Split range Control 10. Cascade Control <p>Controllers</p> <ol style="list-style-type: none"> 1. The principles of operation of an electro pneumatic controller 2. Electronic controller- various 3. Pneumatic controller- various [fuel-air ratio / viscosity] 4. How to adjust it to give variation to the proportional band 5. The principles of a fuel-air ratio controller 6. The action of a viscosity controller 7. Performs routine test and maintenance procedures on the controllers covered by all the above objectives. <p>Control Circuits / Operations</p> <ol style="list-style-type: none"> 1. A single-element control for cooling water and lists its applications 2. A split-range control system for a fuel-valve coolant 3. Why two-element control is sometimes used in cooling systems 4. A two-element cascade control system for piston cooling 5. A control system for lubricating oil temperature 6. A control system for purification of boiler fuel oil 7. The principles of control of air conditioning 8. The principles of control of a refrigerated chamber 9. The principles of control of the interface level of an oily-water separator 10. The lighting-up sequence of an automatic combustion system for an auxiliary boiler 11. Perform routine test, maintenance and fault-finding procedures for the control systems covered by the above objectives 12. Testing of pneumatic , and electronic control systems <p>Air Supply</p> <ol style="list-style-type: none"> 1. The need for instrument air of good quality 2. How the required quality of air can be provided 3. How water is removed from the air 4. The means of drying air 5. A diagrammatic layout of an air system for control and instruments 6. The principles of the following: automatic drain; 	
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	<p>auto-unloader; filter regulator</p> <p>Monitoring Systems / Testing</p> <ol style="list-style-type: none"> 1. The sequence of alarm signals, to include: fleeting alarm condition; first alarm in a series of alarms; different light intensities and flashing periods; audible alarms 2. Routine checking of alarm systems 3. The basic principles of an alarm scanner and data logger 4. The uses of information obtained from a data logger <p>Operations and Testing of Electronic Control Systems</p> <p>Electronics Controls</p> <ol style="list-style-type: none"> 1. Advantages / High Speed of signal transmission 2. Explain how to: / and purpose of : <ul style="list-style-type: none"> - Generate proportional action to the error or deviation between measured value and - Desired value - Use of potentiometer for amplified output - Use of D.C. currents within a range / use of resistors - Use of transistors where D.C. input is converted to A.C by use of a chopper -type amplifier - Proportional and integral action <p>Control System & Troubleshooting / Testing:</p> <ol style="list-style-type: none"> 1. Motors, Electrical survey requirements, Calibrate and adjust transmitters and controllers, Control system fault finding. 2. Function test of electrical, Electronic control equipment and safety devices. 3. Troubleshooting of monitoring systems - Test and calibration of sensors and transducers of monitoring system. 4. Software version control - Programmable logic controllers (PLC), Microcontrollers, Digital techniques. <p>Maintenance & repair of the following:</p> <ol style="list-style-type: none"> 1. Electrical and electronic systems operating in flammable areas, Carrying out safe maintenance and repair procedures, Detection of machinery malfunction, location of faults and action to prevent damage. Electrical interference / Suppressors 	
<p>Properties of Fuels and Lubricants used and Monitoring their quality</p>	<p>Physical and Chemical Properties of Oils</p> <ol style="list-style-type: none"> 1. How density measurements are adjusted when the fuel temperature is other than 15° C 2. Viscosity in simple terms 3. The effect on its viscosity of raising the temperature of an oil 4. The approximate viscosities required for satisfactory atomization and combustion 	<p>6 hours</p>

	<ol style="list-style-type: none"> 5. Typical curves of viscosity against temperature 6. Lists factors affected by viscosity 7. 'viscosity index' 8. Upper and lower flashpoints 9. The classification of dangerous fuels 10. The range of flashpoints for kerosene and vaporizing oils 11. Marine fuels have a minimum closed-cup flashpoint of 66° C 12. The range of flashpoints or the approximate closed-cup flashpoint for: petrol; kerosene; diesel oil; heavy fuel oil 13. Lubricating oil 14. The difference between higher and lower calorific values and their uses 15. In principle, how calorific values are determined: by experiment and by calculation 16. The approximate higher calorific values of: Fuel oil, Diesel oil 17. Pour point - the importance of the pour point 18. The cloud point and its significance 19. 'carbon residue' 20. How the quantity of ash in a fuel is determined 21. Names and describes the possible constituents of ash 22. Names other common tests regularly carried out in laboratories on fuels <p>Characteristics of Fuel Oil</p> <ol style="list-style-type: none"> 1. Outline the various physical and chemical characteristics associated with fuel oil such as: <ul style="list-style-type: none"> - Density, Viscosity, Flash Point, Pour Point, Carbon Residue, Ash in Fuel, Water in Oil, Sulphur, Vanadium and Sodium, Aluminium and Silicon, Sediments, Compatibility, Specific Energy, Ignition Quality <p>Oil Purification</p> <ol style="list-style-type: none"> 1. An oil settling tank, naming all the fittings 2. The use of the fittings of a settling tank 3. Oil filtration methods, giving the particle size which each method is capable of filtering out 4. The reasons for installing filter coalescers 5. How a lubricating oil filter coalescer works 6. The sequence of operation of an automatic oil-filter module 7. The principles of an oil and water centrifuge 8. The adjustments which have to be made when oils of different densities are being pressured and explains why 9. The factors which govern the limiting particle size in a large bowl centrifuge 10. The operation of a self-cleaning purifier 	
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	<p>Contaminants including microbiological infection</p> <p>Treatment of fuels including storage, blending, pre-treatment and handling</p> <ol style="list-style-type: none"> 1. Monitoring quality: Shore side and shipboard sampling and testing and interpretation of results. 2. LUBRICANTS <ul style="list-style-type: none"> - Lubricating oils are produced from both paraffin and asphalt base crude oils. - A typical closed-cup flashpoint for a lubricating oil. - Compounded oil and its uses. - The disadvantages of using fatty oils in steam machinery - What is meant by, and the effects of, dilution of crank-case oil - Why additives are used in lubricating oils - The effect of elevated temperature on the oxidation of the lubricating oil - How oxidation affects lubricating oils - The purpose and application of additives related to: corrosion, detergency, dispersal, pour point, foaming, viscosity, extreme pressure, emulsifying 3. Shore side and shipboard sampling and testing / interpretation of test results 4. The point at which a sample of lubricating oil for testing should be taken. 5. How alkalinity can be checked 6. How to test for: dispersiveness, contamination with water 7. How viscosity can be checked 8. The factors which contribute towards the formation of tin oxides in white metal bearings 9. The effect of tin oxides present in bearings 10. What can be used to prevent or alleviate the problem of tin oxides in bearings 11. The possible causes of microbial degradation of lubricating oils 12. The symptoms of microbial degradation 13. The means by which microbial degradation may be prevented or remedied 14. The test to be performed ashore in a laboratory analysis, commonly requested by a chief engineer 15. Lists the properties normally examined in a laboratory analysis 16. Performs or witnesses appropriate laboratory tests 	
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	<p>17. Relates typical laboratory analysis to sources of problems on board ship.</p> <p>18. The action to be taken to overcome the problems referred to in the above objective</p>	
Statutory Regulations on Fuel and Ballast Systems	<p>Fuel Systems:</p> <p>Annex I – MARPOL 73/78 – Regulation for Prevention of Oil Pollution.</p> <ol style="list-style-type: none"> 1. Application 2. Hazards / Hazard Areas identified 3. Installation Trials 4. Safety Principles <p>Ship Arrangements and System Design: As approved by Class</p> <ol style="list-style-type: none"> 1. Material Selection 2. Location and Separation of Spaces 3. General Pipe design /High pressure Lines Protection/ Requirements 4. System Configuration / marking and Labelling 5. Storage 6. Bunkering System and Distribution System inside and outside Machinery spaces 7. Ventilation System 8. Fuel Filters 9. Purging Arrangements / Drainage 10. Fire Protection 11. Fire Detection / Alarm System 12. Fire extinction <p>Clean Fuel Regulations:</p> <ol style="list-style-type: none"> 1. Reducing Emissions of Particulates , sulphur oxides and oxides of nitrogen 2. Fuel contents limits [Low sulphur fuel regulations] – Compliant fuel 3. Impact on Environment 4. Annexes covered- VI 5. Individual Countries – coastal boundary / in port requirements/adherence and established shipping lanes <p>Ballast Systems:</p> <p>General:</p> <ol style="list-style-type: none"> 1. Ballast water for stability , balance and structural strength 2. Operation in shallow waters , air draught requirements 3. Safe and efficient operation for ocean going ships 4. Ballast water contents 5. Exposure to unprepared environments 6. Economic harm <p>Ship specific Arrangement for storing Ballast / System Design</p> <p>Meeting Statutory Regulation Requirements as in force now & later</p>	3 hours

	<ol style="list-style-type: none"> 1. Why Ballast Water of Concern? 2. IMO adoption of Ballast Water management 3. What needs to be done? 4. What is Ballast Water exchange? <p>Guidelines</p> <ol style="list-style-type: none"> 1. Control and manage BW sediments 2. New treatment technologies – Guidelines 3. Standards for BW exchange and Treatment 4. Ballast Water Management Plan & Retrofit Installations approved by Flag <p>Administration</p> <ol style="list-style-type: none"> 1. Record Book 2. Certification- An International BWM Certificate 3. Safety assessment of treatment systems. 	
Total Hours: 33		

MARINE ENGINEERING PRACTICE		
General Principles involving repairs:	<ol style="list-style-type: none"> 1. Marine Engineering practices – safe working practices in machinery room and other enclosed spaces. 2. Appropriate planning, specification, material and equipment for maintenance and repairs including statutory and class verifications. 	6 hours
Maintenance of Marine Auxiliaries	<ol style="list-style-type: none"> 3. Knowledge of normal operating conditions and parameters and detection of machinery. Malfunction, location of faults and action to prevent damage. 4. Detection of faults of machinery by visual inspection, NDT methods and other advanced systems such as vibration monitoring (condition monitoring). Inspection and adjustment of equipment. 5. Modern approach to machinery reliability methods and their execution. Principles of Tero technology. 6. Overhauling of main engine, auxiliary engine, pumps, air compressors, separators, heat exchangers, fresh water generators, deck machinery, refrigeration and air conditioning machinery, auxiliary boiler and allied machinery and testing of such machinery and testing of such machinery after overhaul. 7. Organizing and carrying out of maintenance by CSM, planned and preventive maintenance keeping in mind the technical, legislative and safety procedural requirements. Principles of tribology and its practices. 8. Hull inspection, maintenance and repairs of vessel in Dry dock. 	45 hours
Safe working	<ol style="list-style-type: none"> 1. Precautions against fire and explosion. Checking for 	9 hours

practices	<p>explosive / toxic conditions, source of ignitions, and requirement of hot work permit before undertaking repairs.</p> <ol style="list-style-type: none"> 2. Mechanical safety in workshops, lifting gear and the need of protective gear. 3. Dangerous properties of substances including toxicity. 	
Total Hours: 54		

Function: MARINE ELECTRO TECHNOLOGY		
The Electric circuit, Ohm's Law, Kirchhoff's Law, simple series and parallel circuits. The Superposition and Thevenin's theorems	<ol style="list-style-type: none"> 1. Conductors, insulators, resistors, voltage and current. 2. Law of resistance, factors affecting resistance of conducting material 3. Ohm's law, D. C. series and parallel circuits, 4. EMF, electrical potential difference 5. Kirchhoff's Law 6. Simple series and parallel circuits, 7. Superposition and Thevenin's theorems 	9 hours
Electrolytic action and secondary cells	<ol style="list-style-type: none"> 1. Safe – handling and using batteries. 2. Advantages of batteries and its uses on board ship. 3. Primary and Secondary cell 4. Series and parallel connection of batteries 5. Emergency and essential power fed by batteries 6. Faraday's law of electrolysis 7. Lead Acid Battery action, construction features, design requirements 8. Polarization of battery 9. Rating of batteries, charging and discharging of batteries 10. Alkaline batteries, Nickel-Cadmium batteries. 11. Battery maintenance and different charging systems 	6 hours
Electrostatics, series and parallel circuits involving capacitors, Energy stored in a capacitor	<ol style="list-style-type: none"> 1. Static Electricity 2. Laws of Electrostatics 3. Electrostatic field, Electrostatic induction 4. Capacitor, Capacitance, charging of capacitors, capacitors leakage 5. Electrostatic charge, dielectric stress, dielectric constant 6. Capacitor rating, energy stores in capacitor, series and parallel circuits 7. RC Time constant 8. Polarized and non polarized capacitors 	3 hours
Magnetic circuits, Magneto motive force, Permeability,	<ol style="list-style-type: none"> 1. Nature of a magnetic field, magnetism, lines of flux 2. Ferromagnetic materials, Electromagnetism 3. Flux and flux density, magneto motive force, magnetic field strength 	3 hours

Reluctance, Simple magnetic circuits, Typical B/H and U/B curves. Energy stored in an electric field.	4. Permeability, reluctance, relationship between B and H 5. Magnetic circuits, Air gap fringing and laminated core 6. Energy stored in electric circuit 7. Eddy current and hysteresis	
A. C. Circuits. Effect of inductance and capacitance on the circuit Simple Series and parallel circuits; Relationship between resistance, reactance and impedance, Power factor, Power in single phase and three phase a. c. circuits	1. Development of SINE wave. 2. Effective value, average value and RMS value 3. Phase angle, voltage, current and frequency calculation 4. Inductance, Inductive reactance 5. Capacitance and Capacitive reactance 6. Impedance, Impedance in R-L circuits, R-C circuits and R-L-C circuits 7. Power triangle, apparent power, true power, reactive power and power factor 8. Power in single phase and three phase circuits	9 hours
A. C. Machines the principles, constructional details and protection of salient pole, cylindrical and brushless alternators. The EMF equation and automatic voltage regulation for an alternator. A.C. Switch gear, Generator Protection; Parallel operation of Alternators	1. Main source of power requirements on ship, power generation of ship 2. Working principle of alternators 3. Construction details of alternators – Salient pole and cylindrical rotors 4. Damper windings, 5. Alternator rating 6. Operational control of synchronous generators 7. Single generator true power, reactive power 1. Parallel operation of generators, 2. Sychroscope, synchro-lamps, synchronizing with voltmeter 3. Speed droop, effect of speed droop on operation of generators in parallel. 4. Multiple generators – true power and reactive power 5. Automatic voltage regulator, error sensing and static AVR 6. EMF equation, coil pitch, distribution factor, voltage regulation 7. Main circuit breaker, arcing phenomenon, methods of interruption of arc. 8. Magnetic circuit breakers, thermal circuit breakers, MCB, MCCB, ACB 9. Alternator protection – over current, short circuit, over/under voltage, over/under frequency, earth leakage, reverse power	12 hours
A.C. Motors: The principles,	1. C. motor – Types of motor 2. Induction motor – advantages and disadvantages	12 hours

construction details and protection of induction motors. Slip, rotor. Slip rotor E.M.F and frequency, Torque Speed equations .Wound, slip ring, cage and double wound type motors. Starting methods.	comparison with D. C. motors 3. Working principle, rotating magnetic field theory, construction of motors 4. Synchronous speed, frequency, slip, torque, torque speed curve of induction motors 5. Power flow in motors 6. Effect of rotor resistance in motors, double cage induction motor 7. Speed control of induction motors – Pole changing method, Electro- hydraulic drive, Wound-rotor resistance control of induction motors, Ward-Leonard D.C. motor drive, By stator voltage control, By keeping voltage by frequency ratio constant (Variable-frequency induction motor control) 8. Motor starters – DOL, star-delta starter, auto-transformer starter, soft starter 9. Motor protection – temperature, over current, short circuit current, single phasing	
Transformers: The E.M.F. equation and efficiency. Auto transformers and current transformers.	1. Transformer – operating principle, construction 2. EMF equation of transformers, 3. Elementary theory of ideal transformer 4. Theory of transformer working on load 5. Equivalent resistance, equivalent reactance, equivalent circuit of transformer 6. Leakage flux, short circuit test, open circuit test, voltage regulation 7. Efficiency of transformer, losses in transformer, all day efficiency. 8. Instrument transformers	9 hours
Rectification, distribution, circuit protection, batteries, deck machinery, insulation testing	1. Insulated neutral and neutral earth system for power distribution, 2. Circuit protection – Circuit breakers, fuses, preferential trips, earth leakage indication and protection 3. Batteries – storage, safety precautions, maintenance 4. Deck machinery drives, starting arrangements 5. Maintenance of motors – overhauling, insulation resistance testing	6 hours
Electronics: Semiconductors, Junction diodes, junction transistors and their operating Characteristics, Simple Transistor circuits.	1. Conductors, Insulators and Semiconductors 2. Types of semiconductors, doping, Intrinsic and Extrinsic semiconductors 3. N-type semiconductors and P-type semiconductors, effect of battery 4. PN junction, forward bias and reverse bias. 5. Junction diode, characteristics of junction diodes 6. Half wave, full wave rectifiers, filter circuits 7. Junction transistors – BJT and FET, transistor characteristics 8. Simple transistor circuits – example - temperature	9 hours

	sensor alarm circuit	
Control Systems: Simple Theory of all control systems, location of common faults and action to prevent damage. Trouble shooting of monitoring system.	<ol style="list-style-type: none"> 1. Process control, controlled condition, Local and remote control 2. Elements and measurements of a control system 3. Definition and control terminology 4. Open loop and close loop control systems and their operation 5. Types of control actions – two step or on/off control, proportional control, Integral control and Derivative control 6. Proportional band, effect of change in proportional band, Gain or proportional control 7. PI control, PD control and PID control action. 8. Actuators, Transducers, 9. Ships control systems 10. Location of common faults, actions to prevent damage, trouble shooting of monitoring systems 	12 hours
Total Hours: 90		

	NAVAL ARCHITECTURE & SHIP CONSTRUCTION	
CENTRE OF GRAVITY	<ol style="list-style-type: none"> 1. Determination of the position of the centre of gravity of a ship in new condition 2. The effect on the position of the centres of gravity of adding, removing & shifting gravity. 3. Stiff and tender ships. 4. The effect of shift of a cargo or solid ballast 5. Free surface effect 	6 hours
TRANSVERSE STABILITY	<ol style="list-style-type: none"> 1. Knowledge of the righting couple when a ship is inclined by an external force. 2. The transverse and longitudinal metacentric height, 3. Stiff and tender ships. 	3 hours
CALCULATION OF AREAS AND VOLUMES	<ol style="list-style-type: none"> 1. The computation of areas of volumes by Simpson's first and second rules 	3 hours
TRIM	<p>THE CALCULATION OF:</p> <ol style="list-style-type: none"> 1. Changes of trim 2. Moment to change trim per centimetre, the position of the centre of floatation being given 3. The use of stability curves and data supplied to a ship 4. Effect of bilging and flooding of a compartment on the ship with regard to increase in draft and 5. Concept of permeability. 	6 hours
STABILITY AND HYDROSTATIC CURVES	<ol style="list-style-type: none"> 1. Use of stability, hydrostatic and stress data supplied to ship 2. Curves of stability and factors affecting the shapes of the curve. 3. Carriage of deck cargo and its influence on stability and structural stresses. 	3 hours

DAMAGE STABILITY	The effect on the following of a ship, in the event of damage 1. Trim and 2. Stability	3 hours
RESISTANCE AND POWERING, PROPELLERS AND RUDDERS	1. Resistance & power calculations. 2. Propellers - Propeller thrust, - Measurement of pitch, - Cavitations 3. Rudders - Simple rudder theory, - Various types of rudders & their applications.	6 hours
SHIP CONSTRUCTION	1. The principle structural members of a ship, 2. Proper names of various parts. 3. The construction of the midship section of single deck and tween deck ships and 4. The construction of liquid/dry bulk carriers, including container and passenger ships. 5. Construction and stiffening of watertight bulkhead including collision bulkhead. 6. The construction of rudders and methods of attachment. 7. The construction, stiffening and closing arrangement of hatchways and superstructure.	15 hours
WELDING AND TYPES OF WELDED JOINTS	1. General ideas on welding processes and 2. Precautions to be taken when such processes are carried out on board 3. Knowledge of basic joints used in welding and preparation of it.	6 hours
STRESSES ON SHIP AND ARRANGEMENTS TO WITHSTAND THE STRESSES	1. Stresses and strains in ships in a seaway or due to loading or ballasting. 2. Local and special stiffening. 3. The parts of a ship which are specially strengthened to withstand local and general stresses or to offset the effects of excessive corrosion.	3 hours
CLASSIFICATION OF SHIPS	1. An outline knowledge of classification of ships/classification societies	3 hours
DAMAGE REPORTING	1. Knowledge of writing a report of damage sustained during a voyage. 2. Directing effective repairs.	3 hours
Total Hours: 60		

	SHIP SAFETY AND ENVIRONMENTAL PROTECTION	
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Certificates and documents	Certificates - Certificates and other documents required to be carried on a ship, how they are obtained and period of their validity. 1. Statutory Certificates 2. Classification Certificates 3. Other Certificates / License 4. Bodies responsible for issuance of certificates.	6 hours
Load lines	Responsibilities under the relevant requirements of the International Conventions on load lines, load line marks, Entries and reports in respect of freeboard, draught and allowances. 1. Verification of Load line marks 2. Dual Load line	3 hours
SOLAS	SOLAS - Knowledge of the relevant requirement of the International Convention for the Safety of 'Life at Sea. 1. Main Objective of SOLAS 2. Overview of the contents of 12 chapters - General Provision - Construction- Subdivision and stability, machinery and electrical installation - Fire protection, Fire detection and extinction - Life Saving appliances - Radio Communications - Safety of navigation - Carriage of cargo - Carriage of Dangerous goods - Nuclear Ships - Management of the safe operation of ships - Special measures to enhance maritime Safety - Additional Safety measures for bulk carriers	20 hours
Pollution Prevention	Knowledge of the M. S. (Prevention of the Pollution of the sea by Oil) Rules, including the keeping of the records and period of Record preservation. Thorough knowledge of prevention of pollution of the marine environment and anti pollution Procedures and precautions. Effects of operational or accidental pollution on Marine environment and application of MARPOL 73 – 78, all Annexes. Anti pollution equipment and anti pollution drills, Familiarity with SOPEP manual. Oily Bilge Separator. Oil discharge Monitoring system for cargo space of tankers. Incinerator. Sewage System. Garbage Management Plan. Air pollution prevention.	20 hours
Health	Crew Accommodation, hygiene, welfare of crew, Inspections	3 hours

	and reports, Maritime Declaration of Health, Port Health Requirements pertaining to BIMMS conference.	
Safety	Outline knowledge of the Acts and Regulations as they affect the management of the ship including Life Saving Appliances and Fire Fighting Equipments, Musters, Drills, Closing of Opening in Hull, and watertight Bulkheads. Safe working Practices.	15 hours
ISM Code	<p>Basic knowledge of ISM Code.</p> <ol style="list-style-type: none"> 1. Good watch keeping practices. Importance of periodic maintenance schedules, musters, drills, and equipment checklist. Maintaining of ship records. Regular logging of various ship parameter readings. Interpretation of variance if any. Maintain and confirm regularly the effectiveness of life saving appliances, fire-fighting appliances and anti pollution equipment's 2. Develop and regularly execute through drills the various emergency plans such as Engine Room Flooding, spill of oil, ship running aground, collision, fire on board the ship, loss of steering. 3. Knowledge of personal management. Organisation of Training on board ships. Duties allocated to crew. 	15 hours
Total Hours: 82		

Total No of Hours: 325 Hours

Bridge Course 7

(For fulfilling gaps in education and training of Indian Navy B-Tech Electrical/Electronic Engineers for Electro-Technical Officer CoC under Regulation III/6)

Annexure 19: Part A of the DGS Order 17 of 2022

Competence	Syllabus	Time
Maintenance and Repair And Repair of Bridge Navigation Equipment and Ship Communication System	<p>Basics of Navigation</p> <ol style="list-style-type: none"> 1. Gives definition of navigation 2. Defines basic navigational terms and their measuring units: latitude, longitude, position, speed, distance, bearing, heading, waypoint, track, cross track error 3. Describes the principle of navigation charts, basic information they contain and their various types: paper charts, electronic charts (Raster, ECDIS) 4. Names and describes various types of navigation: terrestrial (Dead Reckoning), celestial, radar, radio, satellite, inertial <p>Marine Autopilots</p> <ol style="list-style-type: none"> 1. Describes principle of operation – presents various modes of operation 2. Presents an example of modern autopilot and its features 	6 hours
	<p>Voyage Data Recorders,</p> <ol style="list-style-type: none"> 1. Describes basic knowledge of operation and periodic maintenance of Voyage Data Recorder 	1 hours
MAINTENANCE AND REPAIR OF ELECTRICAL, ELECTRONIC AND CONTROL SYSTEMS OF DECK MACHINERY AND CARGO-HANDLING EQUIPMENT	<p>Deck cranes</p> <ol style="list-style-type: none"> 1. Explains principle of operation and names main components of electrical, electronic and control systems of deck cranes, with specific reference to: <ul style="list-style-type: none"> - Single deck cranes - Double deck cranes - Gantry cranes 2. Explains principles of routine inspection, maintenance and repair of deck cranes equipment, with specific reference to: <ul style="list-style-type: none"> - Power supply (slip ring unit) - Cabling and grounding - Switchboards, terminal strips, connectors - Control panels - Portable controllers - PLC outputs and inputs - Electrical motors and brakes - Power electronic converters - Limit switches - Safety devices - Electric control of hydraulic pumps, 	5 hours

	<ul style="list-style-type: none"> motors and brakes - Electric control of grabs, container spreaders and other cargo lifting facilities - Ventilation, heating 	
	Reefer Containers <ol style="list-style-type: none"> 1. Explains principles of routine inspection, maintenance and repair of reefer containers 	6 hours
	Cargo systems on tankers <ol style="list-style-type: none"> 1. Explains principle of operation and names main components of electrical, electronic and control systems of cargo systems on tankers, with specific reference to: <ul style="list-style-type: none"> - Cargo pumps with turbine, electric and hydraulic drive - Inert gas system - Cargo and ballast tanks level measuring and alarm systems - Cargo and ballast valves 	5 hours
	Electrical and Electronic Systems Operating in Flammable Areas <p>Explains parameters of flammable substances as:</p> <ol style="list-style-type: none"> 1. LEL, UEL 2. Temperature class 3. Split on groups and subgroups 4. Split hazardous area on zones or divisions 5. Explains explosion-proof type of protection of electrical equipment for gas-explosive area: 6. Flameproof enclosures "d" 7. Pressurized enclosures "px,py, pz" - powder filling "q" 8. Oil immersion "o" 9. Increased safety "e" 10. Intrinsic safety "ia,ib, ic" 11. Non-incendive "nA, nC, nL, nR, nP" 12. Encapsulation "ma, mb, mc" 13. Optical radiation "op is, op pr, op sh" 14. Explains explosion-proof type of protection of electrical equipment for dust-explosive area 15. Lists type of protection of non-electrical equipment 16. Explains rules of cabling running in hazardous area 17. Explains marking of explosion proof equipment 18. Describes principles of maintenance of electrical explosion proof equipment 19. Explains meaning of IECEx, ATEX and North America approach 20. Explains meaning of Ex certificate 	15 hours

MAINTENANCE AND REPAIR OF CONTROL AND SAFETY SYSTEMS OF HOTEL EQUIPMENT	Elevators <ol style="list-style-type: none"> 1. Names main parts of ship elevator: shaft, pit, machinery room, electric motor with gearbox and brake, motor drive, car, counterweight, car door, landing doors, hoisting ropes with pulleys, over-speed governor, tachogenerator, control cabinet, cabin call system 2. Explains elevator working modes: normal, inspection, learning, priority, fire, hospital, luggage 3. Explains operation of elevator safety devices: safety circuit, emergency stops, car door light barrier and overcurrent protection, over-speed governor 4. Describes maintenance procedures for main elevator components: 5. Hoisting ropes and rope diverting pulleys 6. Equipment in the elevator shaft 7. Car with guides and car door 8. Landing doors 9. Electric motor with gearbox and cooling fan 10. Motor drive and control cabinet 11. Describes use of elevator diagnostic system for troubleshooting and repairs. 12. Explains operation, testing and repair of elevator trap alarm or intercom 	8 hours
ENSURE COMPLIANCE WITH POLLUTION PREVENTION REQUIREMENTS	International Convention for the Prevention of Pollution from Ships, 1973, and the Protocol of 1978 relating thereto (MARPOL 73/78) <ol style="list-style-type: none"> 1. Defines, for the purpose of MARPOL 73/78: harmful substance, discharge, ship, and incident. 2. States that violations of the Convention are prohibited and that sanctions should be established for violations, wherever they occur, by the Administration of the ship concerned 3. Describes the inspections which may be made by port State authorities and outlines actions which they may take 4. Describes the provisions for the detection of violations and enforcement of the Convention 5. States that reports on incidents involving harmful substances must be made without delay. Annex I – Oil <ol style="list-style-type: none"> 1. States that the condition of the ship and its equipment should be maintained to conform with the provisions of the Convention 2. States the conditions under which oily 	2 hours

	<p>mixtures may be discharged into the sea from an oil tanker</p> <ol style="list-style-type: none"> 3. states the condition under which oily mixtures from machinery 4. Space bilges may be discharged into the sea 5. Explains the conditions under which the provisions do not apply to the discharge of oily mixtures from machinery spaces where the oil content without dilution does not exceed 15 parts per million. <p>Annex II – Noxious Liquid Substances in Bulk</p> <ol style="list-style-type: none"> 1. Explains that noxious liquid chemicals are divided into four categories, X, Y, Z, OS, such that substances in category X pose the greatest threat to the marine environment and those in category Z the least. <p>Annex III: Harmful Substances Carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons</p> <ol style="list-style-type: none"> 1. States that for the purpose of this annex, empty receptacles, freight containers and portable road and rail tank wagons which have been used previously for the carriage of harmful substances are treated as harmful substances themselves unless precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment <p>Annex IV – Sewage</p> <ol style="list-style-type: none"> 1. Describes the provisions regarding the discharge of sewage into the sea <p>Annex V – Garbage</p> <ol style="list-style-type: none"> 1. States that the disposal into the sea of all plastics is prohibited. <p>Annex VI – Air</p> <ol style="list-style-type: none"> 1. Describes the provisions regarding the emission of SOx and NOx. <p>Basic knowledge of Regulation 37 Annex I MARPOL 73/78</p> <ol style="list-style-type: none"> 1. Describes the key points in a typical shipboard oil pollution emergency plan. <p>Knowledge of anti-pollution equipment required by national legislation – for example,</p> <ol style="list-style-type: none"> 1. Lists that equipment required under OPA 90 of the United States. <p>IMPORTANCE OF PROACTIVE MEASURES</p> <ol style="list-style-type: none"> 1. Describes the importance of proactive measures to protect the marine environment in terms of compliance with the concerning international and national laws or regulations 	
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	<p>2. Describes the responsibilities of master, officer and rating each on board for protecting the marine environment</p> <p>3. Describes the impacts on marine environment brought about by pollution substances</p> <p>4. Explains what tasks concerning pollution substances are carried out on board ships – lists actual proactive measures to be taken on board ships when: - bunkering - transferring oil and other pollution substances - disposing of waste</p>	
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Total No of Hours : 54 Hours

Part – B of DGS Order 17 of 2022

[Nautical discipline]

Transition of Indian naval personnel to Merchant navy

A. Procedure for obtaining Nautical Discipline Certificate of Competency at the Operational Level and Management Level (Foreign going grade) for Specialist Executive branch officers of the Indian Navy.

1. Certificate of Competency as Navigation Watch keeping officer (Officer In Charge of a Navigational Watch on ships of 500 Gross Tonnage or more (FG):

1.1 Eligibility:

- 1.1.1 The minimum requisite seagoing service of 30 months of naval seagoing service on ships of 500 gross tonnage or more including 6 months of bridge watch- keeping duties with Indian naval Watchkeeping certificate; and
- 1.1.2 Six months of Cargo related duties such as explosive cargo on board Indian Navy ships of 500 gross tonnage or more or any other cargo related duties on Indian Navy or Merchant Navy ships of 500 gross tonnage or more;
- 1.1.3 Course completion certificate issued by DGS approved MTI/ DGS Approved IN Institution for 2nd Mate function Course covering subjects (i) Terrestrial and Coastal navigation, (ii) Celestial Navigation, (iii) Meteorology, (iv) Bridge Equipment, Watchkeeping & Emergencies (v) Cargo handling & stowage and (vi) Ship Construction, Stability, Ship Safety and Environmental Protection.
- 1.1.4 Modular course completion certificate issued by DGS Approved MTI/DGS Approved IN Institution; (i) Radar observer simulator course (ii) Automatic Radar Plotting Aids (ARPA), (iii) Electronic Chart Display Information System (ECDIS), (iv) Global Maritime Distress and Safety System, (v) Proficiency in survival craft, Rescue boats, other than fast rescue boats, (vi) Advanced firefighting, (vii) Medical first aid, (viii) Ship security officer.
- 1.1.5 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

1.2 Requirements:

- 1.2.1 Written examination in the subjects mentioned at para A.1.1.3.
- 1.2.2 Oral assessment in Navigation, Cargo Handling and Ship Operation Functions at the Operational Level for foreign going ships.

2. Certificate of Competency as Chief Mate on ships of between 500 Gross Tonnage and 3000 gross tonnage operating worldwide (FG).

2.1 Eligibility:

- 2.1.1 Meet the requirements for obtaining Certificate of Competency as Officer in Charge

of a Navigational Watch on ships of 500 Gross Tonnage or more (FG).

- 2.1.2 Have completed minimum 12 months of seagoing service on Indian navy or Merchant navy ships of 500 gross tonnage or more while holding Watchkeeping certificate including 6 months of cargo related watches/ duties on board such vessels.
- 2.1.3 Course completion certificate issued by DGS approved MTI/DGS Approved IN institution for Chief Mate Phase 1 (FG) covering subjects (i) Terrestrial and Celestial Navigation, (ii) Meteorology (iii) Cargo handling and Stowage, (iv) Naval Architecture paper I, (v) Ship safety, damage control and Management of personnel; and
- 2.1.4 Course completion certificate issued by DGS Approved MTI/ DGS Approved IN institution for Chief Mate phase 2 (FG) covering subjects (i) Navigational aids including compasses, (ii) Bridge Watchkeeping and ship handling & emergencies, (iii) Naval Architecture Paper II, (iv) Engineering knowledge, instruments & control systems, (v) Maritime Legislation.
- 2.1.5 The scope of the written examination is for unlimited tonnage and oral examination scope is optional and left to candidates to choose to appear for unlimited tonnage, or limited tonnage to 3000 gross tonnage.
- 2.1.6 Modular course completion certificate issued by DGS Approved MTI/ DGS Approved IN institution; (i) Radar, ARPA, and Navigation simulator course (i.e RANSO) and (ii) Medical care.
- 2.1.7 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

2.2 Requirements:

- 2.2.1 Written examination in the subjects mentioned at para A.2.1.3 and A.2.1.4.
- 2.2.2 Oral assessment in Navigation, Cargo Handling and Ship Operation Functions at the Management Level for foreign going ships.

3. Certificate of Competency as Chief Mate on ships of 3000 gross tonnage or more operating worldwide (FG).

3.1 Eligibility:

- 3.1.1 Meet the requirement of Certificate of Competency as Chief Mate on ships of between 500 Gross Tonnage and 3000 gross tonnage operating worldwide (FG); and
- 3.1.2 Have completed minimum 12 months of seagoing service on Indian navy or Merchant navy ships
- 3.1.3 Three months of merchant navy seagoing service while holding 2nd Mate/Chief Mate CoC with TAR book (Diploma in Nautical Science (DNS), TAR book is required to be completed for function 2 and 3 activities); or
- 3.1.4 Twelve months of Merchant navy seagoing service on ships of more than 3000 gross tonnage while holding Chief Mate CoC between 500 gross tonnage and 3000 gross tonnage.

3.2 Requirements:

- 3.2.1 Oral assessment in Navigation, Cargo Handling and Ship Operation Functions at the

Management Level for foreign going ships. The oral requirement is exempted for those candidates who have already taken their oral examination for unlimited tonnage at the time of issuance of certificate of competency for chief mate between 500 gross tonnage and 3000 gross tonnage.

4. Certificate of Competency as Master on ships of between 500 Gross Tonnage and 3000 gross tonnage operating worldwide (Foreign going).

4.1 Eligibility:

- 4.1.1 Meet the requirements for obtaining Certificate of Competency as Chief Mate on ships of between 500 gross tonnage and 3000 gross tonnage; and
- 4.1.2 Have completed minimum 12 months of bridge Watchkeeping duties on ships of 500 gross tonnage or more on ships of Indian navy or Merchant navy; and
- 4.1.3 Have completed minimum 12 months of cargo related duties on ships of 500 gross tonnage or more on ships of Indian navy or Merchant navy; and
- 4.1.4 During the above seagoing service candidates must have at least 12 months [after holding Command Exam Oral Board certificate] as Executive Officer (XO) on an Indian Navy ships (equivalent to chief officer in merchant navy) or Commanding Officer (CO) of an Indian navy ship (Equivalent to Master in Merchant navy).
- 4.1.5 Course completion certificate issued by DGS Approved MTI/DGS Approved IN institution for Advancedshipboard management (Master FG).
- 4.1.6 Modular course completion certificate issued by DGS Approved MTI/DGS Approved IN institution; (i) Ship Maneuvering simulator and Bridge team work (SMS).
- 4.1.7 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

4.2 Requirements:

- 4.2.1 Written examination in the subject stated above i.e. Advanced Shipboard Management.
- 4.2.2 Oral assessment at the Master Level for foreign going voyages.
- 4.2.3 The scope of the written examination is for unlimited tonnage and oral examination scope is optional and left to candidates to choose to appear for unlimited tonnage, or limited tonnage to 3000 gross tonnage.

5. Certificate of Competency as Master on ships of more than 3000 gross tonnage operating worldwide (FG).

5.1 Eligibility:

- 5.1.1 Meet the requirement of Certificate of Competency as Master on ships of between 500 Gross Tonnage and 3000 gross tonnage operating worldwide (FG); and
- 5.1.2 Have completed minimum 12 months of seagoing service on Indian navy ships of 3000 gross tonnage or more with at least 12 months as Commanding Officer (CO) of an Indian navy ship (Equivalent to Master in Merchant navy); and 3 months of Merchant navy seagoing service while holding Master CoC between 500 gross tonnage and 3000 gross tonnage; or
- 5.1.3 12 months of Merchant navy seagoing service on ships of more than 3000 gross tonnage or more while holding Master CoC between 500 gross tonnage and 3000 gross tonnage.

5.2 Requirements:

5.2.1 Oral assessment for Master foreign going ship at the Management Level. The oral requirement is exempted for those candidates who have already taken their unlimited oral at the time of issuance of certificate of competency for Master between 500 gross tonnage and 3000 gross tonnages.

5.3 The detailed flow chart for transition scheme for Indian navy specialist executive branch officers to in Merchant Navy (FG) is enclosed as Annex -1

B. Procedure for obtaining Nautical Discipline Certificate of Competency at the Operational Level and Management Level (Near coastal voyages) for Executive branch officers of the Indian Navy (IN).

1. Certificate of Competency as Navigation Watch keeping officer (Officer In Charge of a Navigational Watch on ships of 500 Gross Tonnage or more (Near Coastal Voyages):

1.1 Eligibility:

- 1.1.1 The minimum requisite seagoing service of 33 months of naval seagoing service on ships of 500 gross tonnage or more including 6 months of bridge watch- keeping duties with Indian naval watch keeping certificate; and
- 1.1.2 Six months of Cargo related duties (Explosive cargo) on Indian Navy ships of 500 gross tonnage or more or any other cargo on ships of Indian Navy/Merchant Navy on ships of 500 gross tonnage or more; or Three months Sea going service on Merchant Navy vessels of 500 gross tonnage or more with approved TAR book for deck cadets (Diploma in Nautical Science (DNS), TAR book is required to be completed for function 2 and 3 activities).
- 1.1.3 Course completion certificate issued by DGS Approved MTI/DGS Approved IN institution for Navigation Watch Keeping Officer Course covering subjects (i) Terrestrial and Coastal navigation, (ii) Celestial Navigation, (iii) Meteorology, (iv) Bridge Equipment, Watchkeeping & Emergencies (v) Cargo handling & stowage and (vi) Ship Construction, Stability, Ship Safety and Environmental Protection.
- 1.1.4 Modular course completion certificate issued by DGS Approved MTI/DGS Approved IN Institution; (i) Radar observer simulator course (ii) Automatic Radar Plotting Aids (ARPA), (iii) Electronic Chart Display Information System (ECDIS), (iv) Global Maritime Distress and Safety System, (v) Proficiency in survival craft, Rescue boats, other than fast rescue boats, (vi) Advanced firefighting, (vii) Medical first aid, (viii) Ship Security officer.

- 1.1.5 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

1.2 Requirements:

- 1.2.1 Written examination in the subjects mentioned in para B.1.1.3.
- 1.2.2 Oral assessment in Navigation, Cargo Handling and Ship Operation Functions at the Operational Level for near-coastal voyages.

2. Certificate of Competency as Mate of a Home Trade Ship (Chief Mate on ships of-between 500 Gross Tonnage and 3000 gross tonnage operating in near Coastal voyages).

2.1 Eligibility:

- 2.1.1 Meet the requirements for obtaining Certificate of Competency as Navigation Watch keeping officer (Officer in Charge of a Navigational Watch on ships of 500 Gross Tonnage or more (NCV)).
- 2.1.2 Have completed minimum 12 months of seagoing service on ships of 500 gross tonnage or more on ships of Indian navy or Merchant navy while holding watchkeeping certificate including 6 months of cargo related watches/duties on board such vessels after obtaining Long Navigation & Direction course or Command qualified oral board certificate; and
- 2.1.3 If the cargo watches have kept on ships of Indian navy only, then 3 months of merchant navy shipboard seagoing Service/ familiarisation in cargo handling is required; and
- 2.1.4 Course completion certificate issued by DGS approved MTI/DGS Approved IN institution for Chief Mate Phase 1 (NCV) covering subjects (i) Terrestrial and Celestial Navigation, (ii) Meteorology, (iii) Cargo handling and Stowage, (iv) Naval Architecture paper I, (v) Ship safety, damage control and Management of personnel; and
- 2.1.5 Course completion certificate issued by DGS Approved MTI/DGS Approved IN institution for Chief Mate phase 2 (NCV) covering subjects (i) Navigational aids including compasses, (ii) Bridge Watchkeeping and ship handling & emergencies, (iii) Naval Architecture Paper II, (iv) Engineering knowledge, instruments & control systems, (v) Maritime Legislation.
- 2.1.6 Modular course completion certificate issued by DGS Approved MTI/DGS Approved IN institution; (i) Radar, ARPA, and Navigation simulator course (i.e RANSCO) and (ii) Medical care.
- 2.1.7 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

2.2 Requirements:

- 2.2.1 Written examination in the subjects mentioned in para B.2.1.4 & B.2.1.5.

2.2.2 Oral assessment in Navigation, Cargo Handling and Ship Operation Functions at the Management Level for near-coastal voyages.

3. Certificate of Competency as Master of a Home Trade Ship (Master on ships of between 500 Gross Tonnage and 3000 gross tonnage operating in near Coastal voyages.)

3.1 Eligibility:

3.1.1 Meet the requirements for obtaining Certificate of Competency as Chief Mate on ships of between 500 gross tonnage and 3000 gross tonnage; and

3.1.2 Have completed minimum 24 months of seagoing service on ships of 500 gross tonnage or more on ships of Indian navy or Merchant navy while holding watchkeeping certificate including 6 months of cargo related watches/duties on board such vessels; or 12 months of seagoing service on ships of 500 gross tonnage or more of merchant navy as chief officer with certificate of competency as Chief Mate on ships of between 500 gross tonnage and 3000 gross tonnage.

3.1.3 Course completion certificate issued by DGS Approved MTI/DGS Approved IN institution for; Advanced shipboard management (Master NCV).

3.1.4 Modular course completion certificate issued by DGS Approved MTI/ DGS Approved IN institution; Ship Maneuvering simulator and Bridge team work (SMS).

3.1.5 The detailed syllabus for written, oral and modular courses is provided in Training Examination Assessment Program, as applicable.

3.2 Requirements:

3.2.1 Written examination in the subject stated above i.e. Advanced Shipboard Management.

3.2.3 Oral assessment at the Master Level for near - coastal voyages.

4. The detailed flow chart for transition scheme for Indian navy executive branch officers to in Merchant Navy (NCV) is enclosed as Annex-2.

C. Other Transition schemes for Indian navy personnel to merchant navy

1. Certificate of Proficiency as Ratings forming part of a navigational watch (STCWCoP).

1.1 Eligibility:

1. Have completed minimum 60 months of seagoing service on ships of 500 gross tonnage or more on ships of Indian navy; and

2. During the above seagoing service candidates must have completed adequate duties related to bridge watchkeeping, steering, lookout, deck work (Cargo activities), seamanship work and boat work.

3. Course completion certificate for the identified gaps as Annex - 3.

1.2 The detailed flow chart for transition scheme for Indian Navy sailors to Merchant Navy is enclosed as Annex -4

2. Certificate of Competency as Cook (MLC certificate).

2.1 Eligibility:

1. Have completed minimum 60 months of seagoing service on ships of 500 gross tonnage or more on ships of Indian navy; and

2. During the above seagoing service candidates must have completed adequate duties related to Chef/ Cooking in Indian navy.

3. Course completion certificate for the identified gaps as Annex -5.

2.2 The detailed flow chart for transition scheme for Indian navy chefs to Merchant Navy is enclosed as Annex - 6.

Certificate of Competency as General operators (STCW certificate).

2.1 Eligibility:

1. Have completed minimum 60 months of seagoing service on ships of 500 gross tonnage or more on ships of Indian navy; and

2. During the above seagoing service candidates must have completed adequate duties related to radio communication.

3. General operators certificate from Ministry of radio communication.

2.2 The detailed flow chart for transition scheme for Indian navy/Coast Guard radio operators to Merchant Navy is enclosed as Annex -7.

D. Common guidelines

1. Obtain Medical fitness certificate (i.e. certified by IN Doctor or DGS Approved doctors in accordance with STCW and MLC Convention), INDOS Number, Certificate of Proficiency for basic training including basic security training and Seafarers identify cum Continuous Discharge Certificate (CDC) before doing any courses and sea service of merchant navy.

2. Candidates who have undergone Specialization in Navigation by undergoing the Long Navigation and Direction course at the Management Level in the Indian Navy shall be exempted from the requirements of the course, written & oral examination in all the subjects of the

Navigation Function at both the Operational Level as well as at the Management Level.

3. Seagoing service performed on ships of less than 500 gross tonnage shall be considered in accordance with the Training Examination Assessment Program, as applicable.
4. Certificate of Competency will be delivered directly to Directorate of Personnel (DOP), Integrated Headquarters of the Ministry of Defence (Navy) and not to the candidates. IN to handover CoC to personnel on release/ retirement.
5. Specialist Executive Officers mean officers of the Executive Branch of the Indian Navy having specialisation in Long Navigation and Direction (LND), Anti-Submarine Warfare (ASW), Communication (C), Gunnery (G) and Nuclear Biological Chemical and Damage Control (NBCD).
6. Familiarisation on merchant vessels for two-week period (one week ashore and one week on board or two weeks on board merchant navy vessels) is required to be completed before CoC is handed over by Directorate of Personnel (DOP), Integrated Headquarters of the Ministry of Defence (Navy) to the officer. For CoC in respect of Chief Mate/ Master (FG) unlimited, seagoing service on MN ships would be 3 months and, therefore, no familiarisation would be required.
7. Documentary evidence related to Sea going service including service related to cargo duties shall be issued exclusively by only the Directorate of Personnel (DOP) and documentary evidence related to training & education shall be issued exclusively by only Directorate of Naval Training (DNT), of Integrated Headquarters of the Ministry of Defence (Navy).
8. Any seagoing service performed on Merchant ships shall be endorsed in CDC by Master of vessel and have obtained watchkeeping certificate from Master as per prescribed format provided in DGS Circular for Merchant Navy Officers.
9. The syllabus for written, oral and modular courses are subject to change based on revised industry practices, any adoption of revised IMO modular courses and any amendments to STCW Convention/STCW Code. DG Shipping will intimate any changes in syllabus to Indian Navy accordingly.
10. The documentary evidence may be provided by the Indian navy for any of the mentioned modular courses or competency courses for recognition of similar education and training provided by Indian Navy to their personnel for the issuance of Certificate of Proficiency by the DGS based on the provision of the STCW Convention/STCW Code.

Annexure 1: Part B of DGS Order 17 of 2022

Indian Navy Specialist Executive officers¹ to Merchant Navy

30-Months of naval seagoing service on ships of 500 gross tonnage or more including 6 Months of Bridge Watch-Keeping duties(Navy to certify) with Naval Watch keeping Certificate
AND
06 months of cargo related duties (Explosive cargo on IN or any other cargoon ships of 500 gross tonnage or more IN/MN)
(Navy to certify)

Sea-Service
12 Months IN seagoing service on ships of 3000 gross tonnage⁹ or morewith at least 12 months as Commanding officer of an Indian navy ship (equivalent to Master in MN) and 3M of MN seagoing serviceor 12 M service in

Education and Training and DGS examination

1. Course completion certificate for identified gaps.
2. Written and oral for gaps (i.e. function 2 and 3)

Issue of 2nd Mate (FG) CoC
Unlimited

Normal Process to follow for Chief Mate (FG) and Master (FG)

Issue of Chief Mate (FG) CoC
Limited to 3000 GT

Sea-Service

12 Months naval seagoing service on ships of 500 gross tonnage or more⁹ including 06 months of cargo related duties (Explosive cargo on IN or any other cargo onships of IN/MN)

Education and Training and DGS examination

Post Sea Competence Course for Chief Mate (FG) (Navigation Function is optional for long ND Course holders (Navy to certify).

Post Sea Modular Course for Chief Mate.

Written and Oral⁶ examinations

Sea-Service
12 Months IN seagoing serviceon ship of 3000 gross tonnage⁹including 6 months of Bridge Watchkeeping duties after holding command exam oral board certificate and 3M of MN seagoing service as 2nd Mate or Mate with TAR Book OR 12M of Merchant ship service. (Navy to certify based on CDC entries).

Education and Training and DGS examination

- Post Sea Competence Course for Master (FG)
Post Sea Modular Course for Master (FG).
Examination and orals⁶

Examination of DGS
Orals⁶

Issue of Master (FG) CoC limited to 3000 GT

Issue of Master (FG) CoC Unlimited

Sea-Service

12 Months bridge Watchkeeping duties at sea and 12 months of cargo related duties (Explosive cargo on IN or any other cargo on ships of IN/MN of 500 gross tonnage or more)including at least 12 months as XO after holding command exam oral board certificateon an Indian navy ship (equivalent to Chief officer in MN) or Commanding Officer of an Indian Navy ship (equivalent to Master in

Examination of DGS

Orals⁶

Issue of Chief Mate (FG) CoC Unlimited

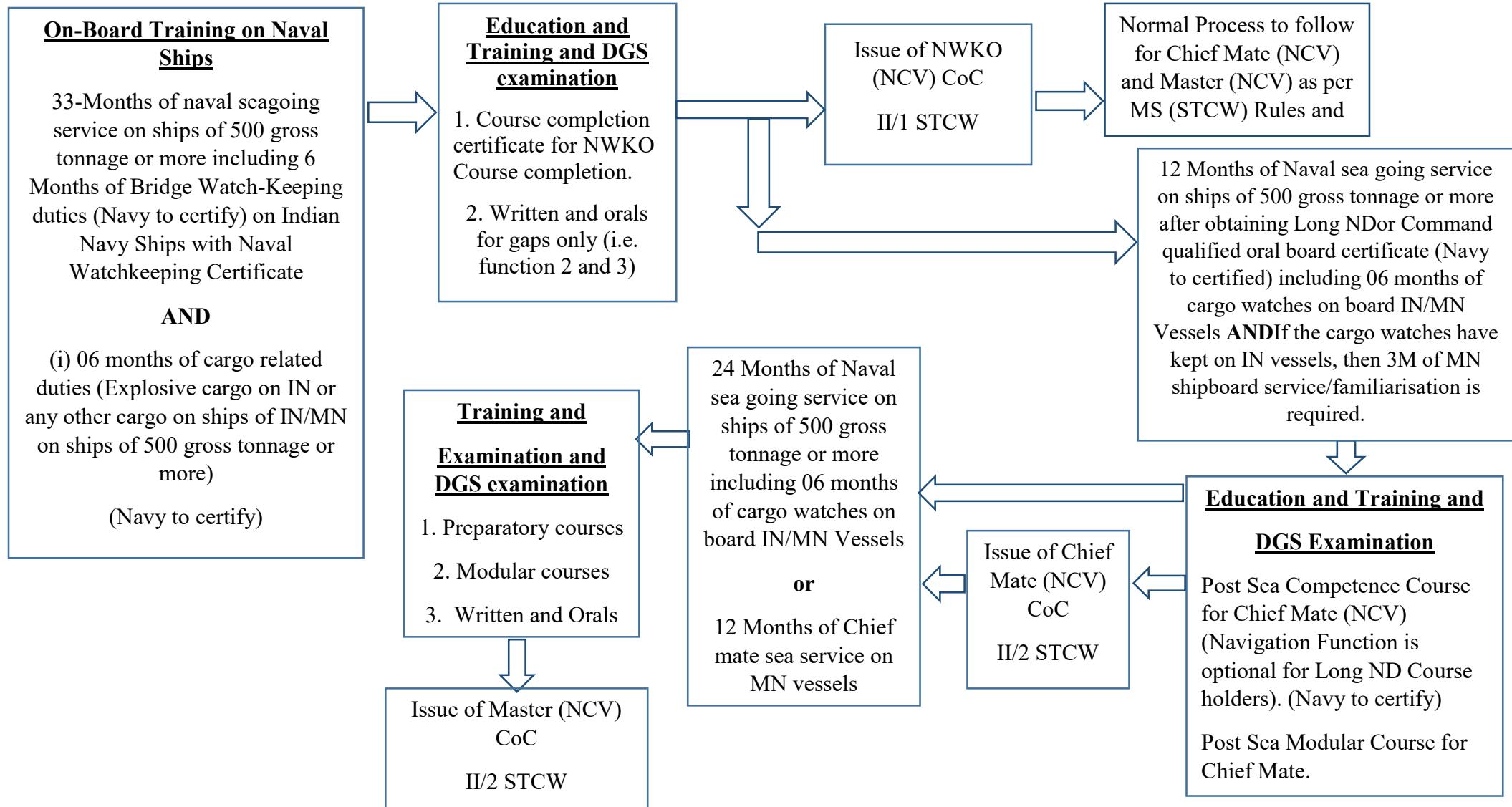
Normal Process to follow for Master (FG)

Note:

1. Specialist executive officers means officers of the executive branch of Indian Navy having specialization in Long Navigation and Direction (ND), Communication(C), Anti-Submarine Warfare (ASW), Gunnery (G) and Nuclear Biological Chemical Damage Control (NBCD).
2. Obtain Medical fitness certificate, INDOS number, Basic COP and CDC before doing any courses and sea service of merchant navy. Medical fitness to be certified by IN Doctors.
3. Certificate of Competency will be delivered directly to Directorate of Personnel (DOP), Integrated Headquarters of the Ministry of Defense (Navy) and not to the candidates.
4. Familiarization on merchant vessels for two-week period (one week ashore and one week on board or two weeks on board merchant navy vessels) is required to be completed before CoC is handed over by Directorate of Personnel (DOP), Integrated Headquarters of the Ministry of Defense (Navy) to the officer. For CoC in respect of Chief Mate/ Master (FG) unlimited, seagoing service on MN ships would be 3 months and, therefore, no familiarisation would be required.
5. Sea service including service related to cargo duties and training & education certification shall be issued exclusively by only the Directorate of Personnel (DOP) and Directorate of Naval Training (DNT), respectively of Integrated Headquarters of the Ministry of Defense (Navy).
6. Chief Mate and Master oral examination for limited COC (Between 500 to 3000 gross tonnage) has the option to give orals for unlimited tonnage. If the candidates have appeared for unlimited oral examinations at the time of issuance of limited Chief mate and Master CoC then oral examination is not required before issuance of unlimited certificate of competency of Chief Mate and Master.
7. Any seagoing service performed on Merchant ships shall be endorsed in CDC by Master and have obtained Watchkeeping certificate from Master as per prescribed format provided in DGS Circular for MN officer.
8. Seagoing service performed on ships of less than 500 gross tonnages shall be counted in accordance with TEAP Manual.
9. 12 Months of the seagoing service on ships of 3000 gross tonnage or more on ships of IN or MN required to completed before issuance of unlimited chief mate or Master CoC.

Annexure 2: Part B of DGS Order 17 of 2022

From Indian Navy Executive Branch officers to in Merchant Navy (NCV Stream).



Note:

1. Obtain Medical fitness certificate, INDOS number, Basic COP and CDC before doing any courses and sea service on board merchant navy vessels for transition. Medical fitness to be certified by IN Doctors.
2. Familiarization on merchant vessels for two-week period (one week ashore and one week on board or two weeks on board merchant navy vessels) is required to be completed before CoC is handed over by Indian Navy to the officer.
3. Certificate of Competency will be delivered directly to Indian Navy and not to the candidates.
4. Sea service including service related to cargo duties and training &education certification shall be issued exclusively by only the Directorate of Personnel (DOP) and Directorate of Naval Training (DNT), respectively of Integrated Headquarters of the Ministry of Defense (Navy).
5. Any seagoing service performed on Merchant ships shall be endorsed in CDC by Master and have obtained Watchkeeping certificate from Master as per format prescribed in DGS Circular for merchant navy officers.
6. Seagoing service performed on ships of less than 500 gross tonnages will be counted in accordance with TEAP Manual.

Annexure 3: Part B of DGS Order 17 of 2022
[Identified gaps for obtaining COP for ratings forming part of navigational watch]

Part 1 – General Aspects

1.5 General Aspects of Shipping

1.5.1 Importance of Shipping in the National and International Trade

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

1.5.2 International Routes

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

1.5.3 Types of Ships and Cargoes:

- 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

1.5.4 Ship board Organization:

- 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 on board 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.

Annexure 3: Part B of DGS Order 17 of 2022
[Identified gaps for obtaining COP for ratings forming part of navigational watch]

1.8 Protection of Environment

Trainee will be able to List the causes of pollution at Sea being discharge from the ships of the following

- Oil
- Chemicals
- Hazardous Goods
- Sewage
- Garbage including Plastics
- Air Pollutants
- Ballast Water Pollution

Trainee will be able to:

- State the consequences of Pollution at Sea
- List the precautions necessary in ships to avoid sea pollution
- List the precautions necessary in ships to avoid Air pollution
- List the steps to take for disposal of ship's garbage and plastics from the ship.
- Explain about the SOPEP Locker, and its utility.

1.9 Shipping Organization (National) & documents for seafarers Trainee will be able to state the major role of the following:

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

Annexure 3: Part B of DGS Order 17 of 2022
[Identified gaps for obtaining COP for ratings forming part of navigational watch]

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.

1.10 International Organizations and Conventions

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

IMO, STCW, SOLAS, ISM, PSC, ISPS Code, ILO, MLC, PHO,

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

Part 2 – General Ship Knowledge (Seaman ship and Bridge duties at Support Level)

2.1.1 Cargo Handling equipment (Derricks, Cranes, Grabs, Gantry, Spreaders, Pumps) (5) 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)

Annexure 3: Part B of DGS Order 17 of 2022
[Identified gaps for obtaining COP for ratings forming part of navigational watch

- Now a day's cranes are replacing the derricks on the ships.
- 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.

2.1.2 Safe Handling, Stowage and Securing of Cargoes and Stores.(6) Trainee will be able to state basic:

- Procedures for safe handling, stowage and securing of Cargoes and stores
- Procedures for safe handling, stowage and securing of dangerous, hazardous and harmful substances and liquids.
- Knowledge and precautions to be observed in connection with particular types of Cargo and identification of IMDG Labels.

2.1.3 Preparing a ship for departure/rough weather/arrival(1) Trainee will be able to explain:

Procedures for preparing a ship for departure/rough weather/arrival

Part3-SLOs-Marine Engineering Knowledge and Practice

GP Rating Syllabus

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

3.10 Level measuring devices and techniques

1. Identify and name different level measuring devices and equipment listed below:
2. Dipsticks, sounding rods, sounding tapes, gauge glass and sight glass.
3. Demonstrate use of dipsticks, sounding rods, sounding tapes, in sounding a level of liquid in a tank.
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 importance of leaving the gauge in a working condition if cocks, air vents have been tried while testing a gauge.

Annexure 3: Part B of DGS Order 17 of 2022
[Identified gaps for obtaining COP for ratings forming part of navigational watch]

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.

3.13 Chemicals on board

1. fuel oil treatment
2. State precautions to be taken while using and handling chemicals on board

3.15 Storage tanks

State types of storage tanks—wing tanks, double bottom tanks, tanks within the engine room

Such as lube oil storage, expansion tank oil sump)

State liquids stored in tanks: Fuel, lubricating oil, and freshwater.

State the purpose & operation of a quick closing valve^c.

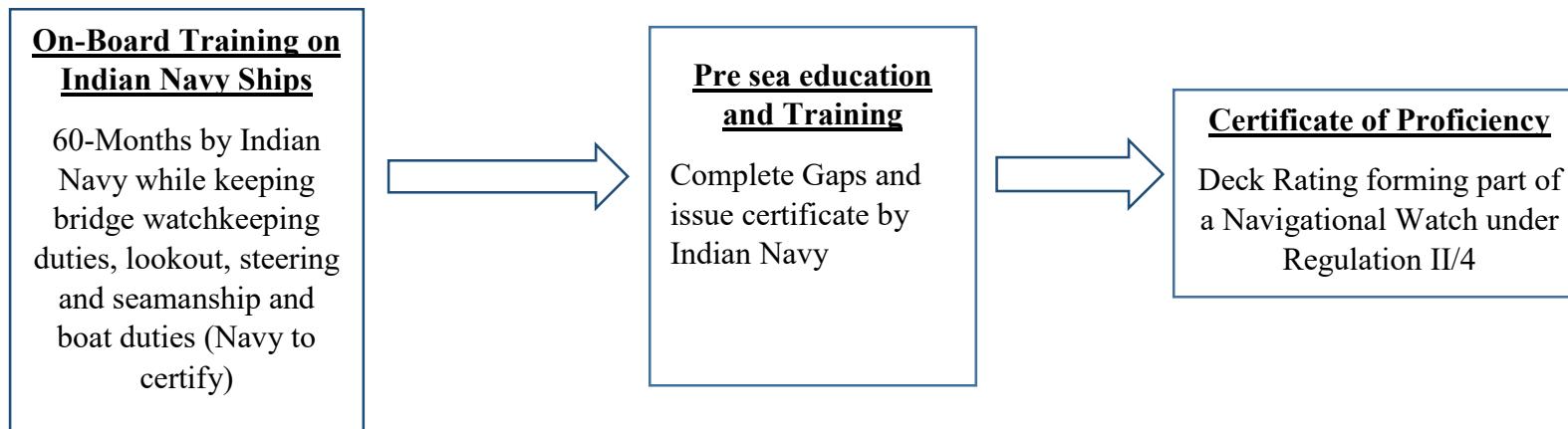
Identify a quick closing valve.

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.

Annexure 4: Part B of DGS Order 17 of 2022

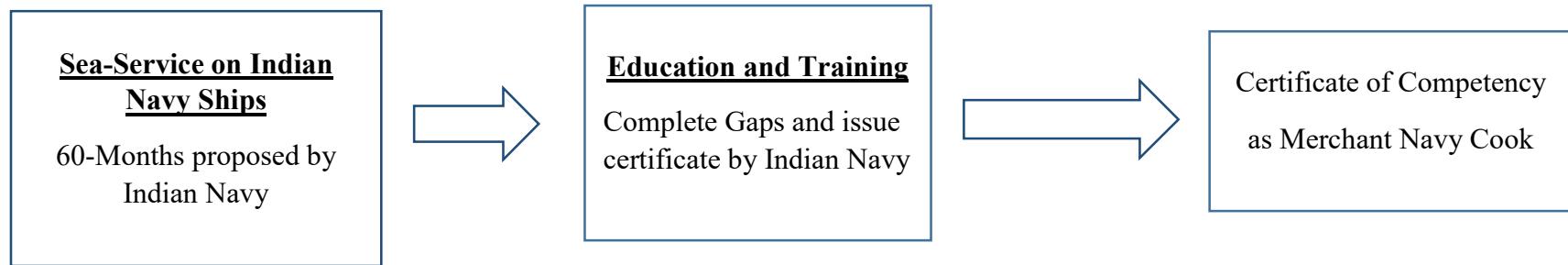
From Indian Navy Deck Sailor to Ratings forming part of navigational watch (II/4 COP)



Annexure 5: Part B of DGS Order 17 of 2022
[Gaps for obtaining CoC as Merchant navy cook for Indian navy personnel]

1. Knowledge of shipping and shipping industry
 - 1.1 Merchant ship types and their function
 - 1.2 Functions of D.G. Shipping, MMD, SEO, Port Health, Customs, Immigration, dock safety Inspection
 - 1.3 Merchant Shipping Act
 - 1.4 Signing on/off and offences and penalties
 - 1.5 Official log book, ship's log book
 - 1.6 Articles of Agreement
 - 1.7 Personal Documents – Passport, CDC, seafarer's profile
 - 1.8 IMO/IMO Conventions - SOLAS, STCW, MLC, ISM code, Flag state Inspections, Port State Control
 - 1.9 MARPOL (Environmental Pollution Control – Garbage disposal)

Annexure 6: Part B of DGS Order 17 of 2022
From Indian Navy Chef to Certified Cook in Merchant Navy



Annexure 7: Part B of DGS Order 17 of 2022

From Indian Navy Radio operators to GMDSS Radio operators CoC in Merchant Navy

