

(Translated from Bengali into English)  
Government of the People's Republic of Bangladesh  
Ministry of Shipping

**Notification**

Dated, 8<sup>th</sup> February 2011 A.D. / 26 Magh 1417 Bangla

S.R.O. No. 26 Law/2011 - In exercise of the powers conferred by section 506 of Bangladesh Merchant Shipping Ordinance, 1983 (Ord. XXVI of 1983), to be read with section 95 and section 111, the Government is pleased to make the following rules, namely-

1. **Short title.** - These rules shall be called the “Bangladesh Merchant Shipping Officers and Ratings Training, Certification, Recruitment, Work Hours and Watch keeping Rules, 2011”.
2. **Definitions.** - (1) Unless there is anything repugnant in the subject, or context, in these rules-
  - (a) “Department” means Department of Shipping established under Bangladesh Merchant Shipping Ordinance, 1983 (Ord. XXVI of 1983);
  - (b) “Approved” means approved by the Director General;
  - (c) “Officer” means Deck Officers, Marine Engineer Officers and other Officers;
  - (d) “Ordinance” means Bangladesh Merchant Shipping Ordinance, 1983 (Ord. XXVI of 1983);
  - (e) “ILO Maritime Labour Convention” means International Labour Organization’s (ILO) Maritime Labour Convention, 2006 as adopted and amended by International Labour Organization;
  - (f) “IMO” means International Maritime Organization;
  - (g) “Convention” means Convention on Standard of Training, Certification and Watch keeping for seafarers, 1978, (STCW) as amended;
  - (h) “Deck Officer” means any person holding certificate of competency as deck officer of any class;
  - (i) “Near Coastal Voyage” means any sea voyage from any ports of Bangladesh carried out within 150 nautical miles from the coast line between ports or places located at coastal area of the Bay of Bengal in between Singapore on the south-east and Colombo on the south-west;
  - (j) “Chief Examiner” means Chief Nautical Surveyor holding Deck Officer Class-1 (Master Mariner) Certificate of Competency or Chief Engineer & Ship Surveyor holding Marine Engineer Officer Class-1 Certificate of Competency of Department of Shipping or any other officer holding Deck Officer Class-1 (Master Mariner)/Marine Engineer Officer Class-1 Certificate of Competency appointed by the government in this behalf for controlling-monitoring-conducting examinations of Deck Officer and Marine Engineer Officer conducted under these rules;
  - (k) “Authorized Medical Officer” means any Medical Officer authorized by the Director General in this behalf;
  - (l) “Appendix” means any enclosed appendix of these rules;
  - (m) “Examinations” means any examination conducted for Certificate of Competency under these rules;
  - (n) “Examiner” means Nautical Surveyor and Examiner / Nautical surveyor / Deputy Nautical Surveyor holding Deck Officer Class-1 (Master Mariner) Certificate of Competency or Engineer and Ship Surveyor and Examiner/ Engineer and Ship

Surveyor / Deputy Engineer and Ship Surveyor holding Marine Engineer Officer Class-1 Certificate of Competency of the Department of Shipping and its sub-ordinate offices, or any qualified Officer holding equivalent Deck Officer Class-1 (Master Mariner) Certificate of Competency /Marine Engineer Officer Class-1 Certificate of Competency appointed by the government for conducting examinations of Deck Officer and Marine Engineer Officer under these rules;

- (o) "Instructor" means certified and experienced person engaged in training at any approved Maritime Training Institute;
  - (p) "Director General" means Director General of the Department;
  - (q) "Marine Engineer Officer" means any person holding certificate of competency as marine engineer officer of any class;
  - (r) "Merchant Marine Training Institute" means any marine academy, institute or marine training institution approved by the government for the purpose of these rules;
  - (s) "Certificate of Competency" means a Certificate of Competency issued under these rules;
  - (t) "Passenger Ship" means a ship carrying more than 12 passengers;
  - (u) "Rating" means any seaman other than Deck Officer and Engineer officers;
  - (v) "Ro ro passenger ship" means any such passenger vessel having ro ro cargo space or special category space as defined in the International Convention for the Safety of Life at Sea, 1974 as amended;
  - (w) "Sea service" means any approved service on board a vessel completed by any seaman or officer under these rules, whose tenure shall be determined in accordance with appendix-1;
  - (x) "Recognized University" or "Recognized Board" means any university or board set up by/or under the law in force for the time being and includes any other recognised university or board approved by the government for the purpose of these rules;
  - (y) "Government" means Ministry of Shipping.
- (2) All those words and terms, not defined in this rules, shall be implied according to the meanings used in ordinance and convention.

**3. Pre-requisites for obtaining Certificate of Competency:** - In compliance with section 83 of the Ordinance, for Certificate of Competency as Deck Officer and Marine Engineer Officer, each person—

- (a) Shall have to pass in the examination conducted by the Department in accordance with Syllabus specified in appendix-2; and
- (b) Shall have requisite qualification as specified in appendix-3 for deck officer's and appendix-4 for Marine Engineer Officer.

**4. Classifications of Certificate of Competency.** – (1) Certificates of Competency shall be as following classes, viz.:-

- (a) Deck Officer Class-1 (Master Mariner) Certificate.
- (b) Deck Officer Class-2 (Chief Mate) Certificate.
- (c) Deck Officer Class-3 (2nd Mate) Certificate.
- (d) Deck Officer Class-4 (Master-Near Coastal Voyage) Certificate.
- (e) Deck Officer Class-5 (Mate-Near Coastal Voyage) Certificate.
- (f) Marine Engineer Officer Class-1 (Chief Engineer Officer) Certificate.
- (g) Chief Engineer Endorsement in Marine Engineer Officer Class-2 certificate
- (h) Marine Engineer Officer Class-2 (2nd Engineer Officer) Certificate.
- (i) Marine Engineer Officer Class-3 (3rd Engineer Officer) Certificate.
- (j) Marine Engineer Officer Class-4 (Coastal Chief Engineer Officer) Certificate.
- (k) Marine Engineer Officer Class-5 (Coastal Engineer Officer) Certificate.
- (l) Marine Electro-Technical Officer Certificate.

- (m) Junior Marine Electro-Technical Officer Certificate.  
(2) Considering the functions and levels of responsibility following Certificates of Competency specified in column 2 shall be required against the capacity specified in column 1 of the table below for service on board ship, viz :-

1	2
Capacity	Certificate of Competency
(1) Master - Unlimited or Master - Ship below 3000 gross tonnage	Deck Officer Class-1
(2) Chief Mate –Unlimited or Chief Mate- Ship below 3000 gross tonnage	Deck Officer Class-2
(3) Second Mate/ Navigating Watch Keeping Officer-Unlimited	Deck Officer Class-3
(4) Near Coastal Vessel Master- -Near Coastal Voyage on ship below 500 gross tonnage or -Maximum 600 nautical miles sea voyage on ship below 1500 gross tonnage or -Coastal Voyage on ship below 3000 gross tonnage.	Deck Officer Class-4
(5) Near Coastal Vessel Mate- -Near Coastal Voyage on ship below 500 gross tonnage or -Maximum 600 nautical miles sea voyage on ship below 1500 gross tonnage or -Coastal Voyage on ship below 3000 gross tonnage.	Deck Officer Class-5
(6) Chief Engineer Officer- Unlimited Chief Engineer Officer- Ship of main engine propulsion power below 3000 kilowatt	Marine Engineer Officer Class-1
(7) Chief Engineer Officer- Ship of main engine propulsion power below 3000 kilowatt	Chief Engineer Endorsement in Marine Engineer Officer Class-2 certificate
(8) Second Engineer Officer-Unlimited or Second Engineer Officer- Ship of main engine propulsion power below 3000 kilowatt	Marine Engineer Officer Class-2
(9) Third Engineer Officer/Watch Keeping Engineer Officer- Unlimited	Marine Engineer Officer Class-3
(10) Coastal Chief Engineer Officer- Coastal voyage on ship of main engine propulsion power below 750 kilowatt,	Marine Engineer Officer Class-4
(11) Coastal Engineer Officer- Coastal voyage on ship of main engine propulsion power below 750 kilowatt,	Marine Engineer Officer Class-5
(12) Marine Electrical Engineer Officer- Unlimited	Marine Electro-Technical Officer
(13) Junior Marine Electrical Engineer Officer- Unlimited	Junior Marine Electro-Technical Officer

**5. Examinations for obtaining Certificate of Competency.** - (1) Required qualification for obtaining Certificate of Competency, place, date, time and rules for Certificate of Competency

- examinations shall be circulated to all concerned by the Department of Shipping by notice and website from time to time.
- (2) Application for appearing in the examination has to be submitted to the Chief Examiner in the form prescribed by the Director General along with such fee as determined by the government and necessary papers.
  - (3) For every certificate of competency shall participate in written, oral and signalling examinations in accordance with syllabuses specified in the appendices.
  - (4) Various methods shall be applied as specified in the STCW code for assessment of required Knowledge, understanding and proficiency of the candidate in respect of his function and level of responsibility during Certificate of Competency examinations.
  - (5) In order to take part in certificate of competency examination of any class/grade, a candidate shall apply in the approved form “Application for Assessment of Eligibility in Examination” to the Chief Examiner at least 30 days before the fixed schedule of the examination along with necessary documents attested by a first class gazetted officer and within five working days of receipt of application, the candidate shall be issued “Notice of Eligibility for Examination” in the approved form and such notice of eligibility shall remain valid for five years.
  - (6) Subject to receipt of Notice of Eligibility for Examination, a candidate shall submit “Application for Examination” for all subjects of the intended grade during first attempt of the examination in the approved form to the Chief Examiner along with applicable fees at least 7 days before the schedule of the intend examination.
  - (7) If unsuccessful in the first attempt of the examination, for subsequent attempt of the examination shall pay fees for all unsuccessful subjects only.
  - (8) Both Bangladeshi and foreign citizens can equally take part in the examination.
  - (9) If any candidate submits any wrong, incorrect, false declaration or documents-evidence for participation in any examination, course, certificate, endorsement or revalidation, the Chief Examiner shall be entitled to cancel the candidate’s examination, course, certificate, endorsement or revalidation.
  - (10) Necessary Sea Service required for certificate of competency examination shall be completed before obtaining Notice of Eligibility for Examination and at least one year approved sea service shall be completed within the preceding five years before obtaining such notice of eligibility for examination.
  - (11) Before participating in certificate of competency examinations of all classes/ grades a candidate shall complete approved preparatory courses in accordance with IMO model course of the concerned class/ grade. Preparatory courses shall be valid for three-year term.
  - (12) For each subject, time for written examination will be three hours and full marks will be 100.
  - (13) If any person does not obtain the minimum marks mentioned against any of the following subjects, he shall not pass the said subject, viz;

Serial No.	Subjects	Minimum Pass Mark (%)
1	2	3
A)	Deck Officer Class-1 (Master Mariner) Certificate Examination :	
	Oral	70
B)	Deck Officer Class-2 (Chief Mate) Certificate Examination:	
	Navigational Aids	60
	Meteorology	50
	Engineering & Control System	50
	Shipboard Operation	60
	Ship Construction	60

	Business & Law	50
	Ship Stability	60
	Navigation	70
	Signalling	80
	Oral	70
C)	Deck Officer Class-3 (2 <sup>nd</sup> Mate) Certificate Examination:	
	General Ship Knowledge	60
	Cargo Operation & Stability	60
	Ocean & Offshore Navigation	70
	Coastal Navigation	70
	Meteorology	50
	Principles of Navigation	60
	Applied Science	50
	Mathematics	50
	Signalling	80
	Oral	70
D)	Deck Officer Class-4 (master-near coastal voyage) certificate Examination:	
	Oral	70
E)	Deck Officer Class-5 (mate-near coastal voyage) certificate Examination :	
	Shipboard Operation & Stability	60
	Navigation	70
	Signalling	80
	Oral	70
F)	Marine Engineer Officer Class-1(Chief Engineer)Certificate Examination:	
	Oral	70
G)	Chief Engineer Endorsement Examination on Marine Engineer Officer Class-2 Certificate :	
	Oral	70
H)	Marine Engineer Officer Class-2 (Second Engineer) Certificate Examination :	
	Applied Mechanics	50
	Applied Heat	50
	Electro-technology	50
	Naval Architecture	50
	Machine Drawing	50
	Engineering Knowledge (General)	50
	Engineering Knowledge (Motor)	50
	Oral	70
I)	Marine Engineer Officer Class-3 (3 <sup>rd</sup> Engineer) Certificate Examination :	
	Applied Mechanics	50
	Applied Heat	50
	Electro-technology	50
	Naval Architecture	50
	Mathematics	50
	Engineering Knowledge (General)	50
	Engineering Knowledge (Motor)	50
	Oral	70

J)	Marine Engineer Officer Class-4 (Chief Engineer Officer-Coastal Voyage) Certificate Examination:	
	Oral	70
K)	Marine Engineer Officer Class-5 (Engineer Officer-Coastal Voyage) Certificate Examination:	
	Naval Architecture	50
	Machine Drawing	50
	Engineering Knowledge (General)	50
	Engineering Knowledge (Motor)	50
	Oral	70
L)	Marine Electro-Technical Officer Certificate Examination:	
	Oral	70
M)	Junior Marine Electro-Technical Officer Certificate Examination:	
	Oral	70

(14) Language of all written and oral examination shall be English.

(15) After appearing certificate of competency examination, if any candidate is not satisfied with the result of any subject, he can apply to the Director General for re-assessment paying applicable examination fees for this subject and on receiving application, the Director General shall arrange for re-assessment of answer script of the subject prayed for.

(16) In case of adopting unfair means in the examination or demonstrating misdemeanour, the chief examiner may cancel candidate's examination including imposition of additional sea service or training requirement or may expel from the examination or training if necessary, considering the seriousness of the misdemeanour.

(17) Fees for Certificate of competency examinations and other related fees shall be determined by the government from time to time.

6. **Exemption.** - (1) Candidate having Maritime Science (Nautical) Degree from Marine Academy or equivalent pre-sea training or degree in Nautical Science from any approved Merchant Marine training Institute or candidate having B.SC. Degree with Physics and Mathematics or any candidate having commissioned in the executive branch of Bangladesh Navy shall be exempted from examination in Mathematics and Applied Science subjects for Deck Officer Class-3 certificate of competency examination, provided that Mathematics and applied science subjects would have been included in the syllabus of the said candidate with similar pass marks and syllabus.

(2) Candidate having Maritime Science (engineering) Degree from Marine Academy or equivalent pre-sea training or degree in Marine Engineering from any approved Merchant Marine training Institute or any candidate having degree in Marine Engineering or Naval Architecture from any recognised university, shall get exemption from examination of the following subjects for Marine Engineer Officer Class-3 certificate of competency examination, provided that following subjects would have been included in the syllabus of the said candidate with similar pass marks and syllabus; viz:-

- (a) Applied Mechanics;
- (b) Applied Heat;
- (c) Electro-Technology;
- (d) Naval Architecture;
- (e) Applied Mathematics.

(3) Candidates having degree of Mechanical Engineering from any recognised university shall get exemption from examination of the following subjects for Marine Engineer Officer Class-3 certificate of competency examination; provided that following subjects would have been included in the syllabus of the said candidate with similar pass marks and syllabus; viz:-

- (a) Applied Mechanics;
  - (b) Applied Heat;
  - (c) Electro-Technology; and-
  - (d) Applied Mathematics.
- (4) Candidates having commissioned in Mechanical Engineering branch of Bangladesh Navy, shall be exempted from examinations of the Applied Heat subject for obtaining Marine Engineer Officer Class-3 certificate of competency examination; provided that Applied Heat subject would have been included in the syllabus of the said candidate with similar pass marks and syllabus.
- (5) Candidates holding certificate of competency as Fishing Vessel Skipper, shall be exempted from appearing the following subjects in the Deck Officer Class-3 certificate of competency examination, provided that following subject would have been included in the syllabus with similar pass marks and syllabus and the date of qualifying in the said subjects shall be within preceding 5 (five) years of date of issuance of Deck Officer Class-3 Certificate of Competency, viz.,
- (a) Ocean and Offshore Navigation;
  - (b) Coastal Navigation;
  - (c) Principles of Navigation.
- (6) Candidate holding certificate of competency as Fishing Vessel Engineer officer Class-1, shall be exempted from subjects of written examination in obtaining Marine Engineer officer Class-3 Certificate of Competency; provided that subjects would have been included in the syllabus with similar pass marks and syllabus, and the date of qualifying in the said subjects shall be within preceding 5 (five) years of date of issuance of Marine Engineer officer Class-3 Certificate of Competency.

**7. Certificate of Competency.** - (1) Subject to passing of all certificate of competency examinations held under these rules and meeting the requirements of all other conditions specified in the rules, certificate of competency shall be issued to each candidate in a format as specified in appendix-5.

- (2) Level of responsibility on board ships and applicable functions accordingly shall be mentioned on Certificate of Competency issued under sub-rule (1) above.
- (3) Level of responsibility on board ships and applicable functions shall be as follows, viz:-
- A) Level of responsibility on-board ship:
    - 1) Management Level- Master, Chief Mate, Chief Engineer Officer, Second Engineer Officer.
    - 2) Operational Level- Watch Keeping Officer (Deck/ Engine), Marine Electrical Engineer officer
    - 3) Support Level- Watch Rating (Deck/Engine), Able Seafarer (Deck/Engine), Electrician and other rating assigned for safety and prevention of pollution responsibility.
  - B) Applicable functions on board ship shall be as follows, viz:-
    - 1) Navigation;
    - 2) Cargo handling and stowage;
    - 3) Controlling the operation of the ship and care for persons on board;
    - 4) Marine Engineering;
    - 5) Electrical-Electronics and Control Engineering;

6) Maintenance and repair; and

7) Radio communication.

- (4) Each certificate of competency issued under these rules shall be deemed to have been issued in accordance with the STCW Convention.
- (5) For issuance of certificate of competency, all written and oral subjects including required ancillary courses shall be fulfilled within preceding five years of issuance of certificate of competency. For issuance of certificate candidate has to pass medical examination and eye test.
- (6) Issue of all Certificates of Competency, dispensations and endorsements, expiry, revalidation, suspension, cancellation, lost, damaged etc shall be registered.
- (7) Authenticity, verification, validity and status of all certificates of competency, dispensations and endorsements shall be provided through electronic database at the request of other states and companies.
- (8) Limits of sea voyages shall be mentioned in the near coastal certificate of competency and agreements shall be made with concerned states of near coastal voyage area.
- (9) All certificates of competency, endorsement and other certificates shall be issued in approved forms.

**8. Recognition of training and certificate of foreign authority and issuance of equivalent**

**Bangladeshi Certificate:** - (1) Director General may recognize training and certificate of competency issued by any foreign authority subject to compliance of the following conditions as equivalent training and certificate of competency under these rules, viz.:-

- (a) The states providing training and issuing certificate of competency shall be a signatory to the Convention;
- (b) Requirements of the convention relating to training and qualification for issuing certificate of competency, its recognition and record keeping shall be fully complied with;
- (c) State providing training and issuing certificate of competency shall have to undertake that any changes, made in training and certification related system, shall be immediately notified to the Director General;
- (d) Seafarer's must be well conversant with Bangladesh Maritime Law in case of certificate of competency at the management level;
- (e) The holder of the certificate of competency shall possess medical fitness and eye test certificate as per rule 25;
- (f) State issuing certificate of competency shall be enlisted under IMO White List.
- (g) States issuing certificate of competency shall have bilateral mutual agreement on recognition of certificate of competency with Bangladesh or shall be state unilaterally recognised by Bangladesh.



- (h) Candidate holding certificate of competency shall submit evidence of fulfilment of all conditions applicable for the class/ grade of certificate of competency as per these rules.
  - (i) If the candidate is holding a certificate of competency issued by a state that is not recognised by Bangladesh, shall have to comply with requirements of the class/grade under these rules including passing examinations as laid down by the chief examiner.
  - (j) If the validity of foreign certificate of competency and ancillary course certificates of the candidate expires, he shall complete approved refresher course and shall submit the valid ancillary course certificate.
  - (k) The accuracy, authenticity and validity of the related certificate shall be verified from certificate issuing authority.
- (2) During the processing of recognition of any certificate of competency under sub-rule (1), if considered necessary by the Director General, may recognize the certificate of competency for a period not more than three months as equivalent to any certificate of competency issued under these rules.
9. **Revalidation of Certificate.** - (1) For service on-board ship, validity of each certificate of competency and certificate of proficiency shall be 5 years and renewable on expiration.
- (2) If any candidate fulfils the requirement for revalidation of certificate may apply for revalidation one year before expiration of validity, viz: -
- (a) He shall pass medical fitness examination and eye test as per rule 25; and
  - (b) The candidate shall have at least 12 (twelve) month sea service in certificate related capacity and function or capacity and function one rank below the certificate within preceding 5 years; or within preceding 6 months before the revalidation of the certificate, shall have at least three-month sea-service in certificate related capacity and function; or within preceding 6 months before the revalidation of the certificate, shall have at least three-month sea-service in similar related capacity and function as supernumerary; or shall have at least two years experience in any post in any shipping related company or any government or semi-government organization related to the capacity and function within preceding 5 years; or shall complete any approved training course or shall pass an approved test and examination.
10. **Dual Certificate of Competency.** - Any person may hold certificate of competency of both Deck Officer and Marine Engineer Officer subject to conditions stipulated in appendix-6, he shall work against any one capacity as mentioned in the certificates of competency.
11. **Compulsory training for service on board ship.** - (1) Prior discharging any functions on board ship, the person appointed shall take approved Safety Familiarizations Training concerning his functions.
- (2) Prior discharging functions on board ship concerning safety and prevention of pollution, the assigned person, in addition to training specified in sub-rule (1), shall have to obtain certificate of proficiency in following approved basic training course, viz:-
- (a) Personal Survival Technique;
  - (b) Fire Prevention and Fire Fighting;

- (c) Elementary First Aid;
  - (d) Personal Safety and Social Responsibility.
- (3) For obtaining certificate of competency of various grades of Deck Officer, any candidate shall have to obtain following course certificates as per requirement of the grade; and shall pass examination conducted and certificate issued by the Department, viz:-
- a) Navigating Watch Keeping Officer or for discharging function of Radio Officer as per section 15 of Bangladesh Merchant Shipping (Radio) Regulation-2002, shall hold following course certificates, viz:-
    - i) GMDSS- (GOC) or
    - ii) GMDSS-(ROC).
  - b) For operating Radar-
    - i) Radar Navigation-(Operation Level); or,
    - ii) Radar Navigation-(Management Level).
  - (c) For obtaining Deck Officer Certificate of Competency shall complete practical training and hold certificate on following;
    - i) Efficient Deck Hand;
    - ii) Navigational Aid and Electronic Navigation System;
    - iii) Electronic Chart Display and Information System (ECDIS)
- (4) Candidate holding Certificate of Competency/proficiency under sub-rule (2) and (3) shall provide evidence of maintaining standard of competence as per the convention every 5 (five) years.
- 12. Endorsement for discharging function on Tanker Vessel (oil/ gas/ chemical):** - (1) For discharging functions relating to cargo or cargo equipments on any Tanker Vessel (oil/chemical), each officer and rating shall have to possess following qualifications and endorsements issued by the Department of Shipping, viz:-
- (a) Three-month sea service in any Tanker vessel (oil/chemical); or
  - (b) Certificate of completion of an approved “Basic training Course for oil and chemical tanker cargo operation”;
  - (c) Passed oral examination conducted by the Department;
  - (d) Shall have “Basic training for oil and chemical tanker cargo operation” Endorsement issued by the Chief Examiner.
- (2) For discharging functions relating to cargo or cargo equipments on any Gas Tanker vessel, each officer and rating shall have to possess following qualifications and endorsements issued by the Department of Shipping, viz:-
- (a) Three-month sea service in any Gas Tanker Vessel; or
  - (b) Certificate of completion of an approved “Basic training Course on liquid gas tanker cargo operation”;
  - (c) Passed oral examination conducted by the Department;

- (d) Shall have “Basic training on liquid gas tanker cargo operation” Endorsement issued by the Chief Examiner.
- (3) For discharging functions relating to cargo or cargo equipments in any Tanker Vessel (oil/ gas/ chemical) at management level, in addition to qualifications and endorsements prescribed in sub-rule (1) and (2), shall have to attain following qualifications and endorsements issued by the Department of Shipping, viz:-
- (a) A certificate of completion of an approved specialised Tanker Course (oil/ chemical/ gas);
  - (b) Shall have three-month sea-service experience in such tanker; or
  - (c) Minimum one month operational training/ sea service experience performing at least 3 loading and 3 discharging operation in such tanker vessel and supported by training record book including “Liquid Cargo Handling Simulator Course” Certificate.
  - (d) Passed oral examination conducted by the Department;
  - (e) Shall have Specialised Tanker Endorsement (oil/gas/chemical) issued by the Chief Examiner.
- (4) For any category of tanker endorsement, shall have an advanced Fire Fighting Course Certificate.
- (5) Validity of any category of tanker endorsement shall be of five years.
- (6) Any candidate can revalidate tanker endorsement for next five years subject to compliance of the following requirements, viz:-
- i) Minimum three months’ sea service on board related tanker performing functions relating to cargo or cargo equipments within preceding 5 years, or
  - ii) Minimum six months’ operational experience in storage tanker or terminal tanker performing functions relating to cargo or cargo equipments; or
  - iii) 14-days supervised training in the Supernumerary capacity on related tanker performing functions relating to cargo or cargo equipments; or
  - iv) Completion of an approved Specialised Tanker Course (oil/gas/chemical).
- (7) Instead of endorsements, on meeting the requirements of these rules, certificates of proficiency shall be issued to candidate not holding certificate of competency issued under these rules.
- 13. Additional qualifications for Master and others of Passenger Ships:** - (1) Prior to joining service in passenger ship seafarers concerned shall complete the following training, viz:-
- (a) Each person shall complete Familiarization Training for discharge of assigned duties;
  - (b) Crowd Management Training for master and others for discharging functions stated in the master list for extending cooperation to passengers during emergency;
  - (c) Approved passenger safety, cargo safety and Hull integrity training for all persons responsible for embarking and disembarking of passenger; loading, securing and discharging of goods and cargo, or securing and closing of hull openings in ro-ro passenger ships;
  - (d) Approved Crisis Management and Human Behaviour training for the person responsible for maintaining safety of passengers during emergency;

- (e) Communication and Safety training for each person responsible for rendering direct service to the passengers in their accommodation;
  - (2) The institute imparting training shall issue proper certificate to the trainee referred to in sub-rule (1).
  - (3) Trainee referred to in article (b), (c), (d) and (e) of sub-rule (1) shall undertake refresher training every five years.
14. **Training and certification related to Ship security.** - (1) For performing functions as ship security officer, any candidate shall hold certificate of proficiency as ship security officer meeting following requirements, viz:-
- (a) Age shall be not less than 18 years;
  - (b) Shall complete at least 12 month approved sea service on board foreign going ship;
  - (c) Shall hold an approved training course certificate conducted for the purpose;
  - (d) Passed oral examination conducted by the Department.
  - (2) Prior being assigned to ship board duties, all seafarers shall receive approved security related familiarization training.
  - (3) Prior being assigned to ship board duties, in addition to sub-rule (2) all seafarers shall hold certificate of proficiency on security awareness training course.
  - (4) All seafarers with designated security duties including anti piracy and anti armed robbery related activities shall complete an approved training course and shall hold a certificate of proficiency.
15. **Pre-requisites for obtaining certificates of Proficiency in Survival Craft, Rescue Boat, Fast Rescue Boat:** - (1) Each candidate shall have to comply following requirements for obtaining certificate of proficiency of Survival Craft and Rescue Boat, viz: -
- (a) Age not less than 18 years;
  - (b) Completed at least 12 month approved sea service;
  - (c) Shall hold an approved training course certificate conducted for this purpose and passed an oral examination conducted by the Department.
  - (2) Each person shall comply with all the requirements referred in sub-rule (1) and shall attend an approved training course conducted for the purpose for obtaining Certificate of Proficiency in Fast Rescue Boat.
  - (3) Candidate holding certificate of proficiency referred in sub-rule (1) and (2), shall provide evidence of maintaining standard of competence as per the convention every five years.
16. **Advance Fire Fighting.** - Each person designated for controlling fire-fighting operations on board ship shall hold a certificate of proficiency on approved Advanced Fire Fighting training course and passed an oral examination conducted by the Department.
17. **Medical First aid and Medical Care training.** - (1) Each person designated to provide medical first aid on board ship shall hold certificate of proficiency on approved medical first aid training course.

(2) Each person designated to take charge of medical care on board ship shall hold certificate of proficiency on approved medical care training course.

18. **Training of Masters, Officers, ratings and other concerned personnel of High Speed Craft, Dynamically supported craft and other ships.** - (1) Masters, officers, ratings and other concerned personnel of high speed ship built on 1 January, 1996 or later shall hold an approved high speed craft type rating training certificate.

(2) Masters, officers, ratings and other concerned personnel of dynamically supported craft shall hold appropriate certificate as per IMO code of Safety for Dynamically Supported Craft.

(3) Director General shall endorse on certificates of Master and officers engaged in navigation of high speed craft.

(4) Masters, officers, ratings and other concerned personnel of ship carrying dangerous and hazardous substances in solid form in bulk and in packaged form, Offshore supply vessel, Ship operating dynamic positioning system, and ship operating in polar regions, prior to being assigned duties on board such ship, shall undertake training and certificated as per applicable IMO guidelines.

19. **Category and recruitment of rating.** - (1) Category and title of rating shall be as follows:-

<u>Category of Rating</u>	<u>Title of Rating</u>
A) Deck Rating	Lascar-3 (Trainee Ordinary Seaman or seamen-3 or deck Boy)
	Lascar-2 (Ordinary Seaman or NWR or Seaman-2)
	Lascar-1 (AB or Able Seafarer Deck or Seaman-1)
	Deck Sareng (Deck Bosun)
	Carpenter
	Plumber
	Pump man
	Deck Fitter
	Fitter/ Welder
	B) Engineering Rating
Greaser-2 (Wiper or EWR)	
Greaser-1 (Oiler or Motor Man or Able Seafarer Engine)	
Engine Serang	
Diesel Mechanic	
Reefer Mechanic	
Electrician	

	Engine Fitter
	Fitter/ Welder
C) Saloon Rating	Steward-2
	Steward-1
	Chief Steward
	Second Cook
	Chief Cook

- (2) For recruitment as rating, ship owner, nominated representative, licensed shipping manning agent or ship's master shall apply to the shipping master.
- (3) Unless qualified as prescribed in appendix-7 and unless recommended by a selection committee appointed by the Director General for the purpose, no rating shall be employed.
- (4) For recruitment as Cook on-board ships under saloon rating, any person shall have to be qualified for certificate of proficiency as ships cook through an oral Examination as directed by Chief Examiner.

20. **Certificate of Proficiency as Navigation Watch Rating and other certificates.** - (1) Each rating involved with navigating watch of ships of 500 GT or above shall hold a certificate of proficiency as navigation watch rating.

- (2) For Certificate of Proficiency as Navigation watch rating under sub-rule (1), any person shall comply with the following requirements, viz.:-
  - (a) Age not less than 16 years;
  - (b) Steering certificate of minimum 100 hours;
  - (c) Minimum 6 months approved sea service including training and experience at Deck department or three months approved sea service in the Deck Department with any approved Deck rating pre-sea training; Sea services referred above shall be related to navigational watch keeping duties under the supervision of master or officer holding certificate of competency / qualified deck rating on board foreign going merchant ships.
  - (d) Secondary School Certificate or equivalent from any recognised board;
  - (e) Any approved navigating watch rating training course and passed in the related Examination;
  - (f) Shall have Medical examination and eye test certificate as per rule 25;
  - (g) Basic training course certificates as per rule 11(2).
  - (h) Qualified in oral examination conducted by the Department
- (3) Any Deck Cadet shall comply with following requirements for certificate of proficiency as navigation watch rating, viz. -
  - (a) Age not less than 18 years;
  - (b) Minimum 6 months approved sea service as Deck Cadet or Deck Cadet with pre-sea training 3 months sea service;
  - (c) Higher Secondary School Certificate or equivalent with physics and mathematics from any recognised board;
  - (d) Minimum 100 hours steering experience;

- (e) Medical examination and eye test certificate as per rule 25;
  - (f) Basic training course certificates as per rule 11(2).
  - (g) Qualified in oral examination conducted by the Department
- (4) For Able Seafarer Deck certificate of proficiency on ships of 500 GT or more, any candidate shall comply with following requirements, viz:-
- (a) Age not less than 18 years;
  - (b) certificate of proficiency as Navigation Watch Rating;
  - (c) Any approved Able Seafarer Deck rating training course and passed in the related Examination;
  - (d) Certificate of Proficiency in Survival Craft and Rescue Boat;
  - (e) Medical examination and eye test certificate as per rule 25;
  - (f) After holding certificate of proficiency as navigation watch rating 12 months sea service in the Deck Department with any approved Deck rating pre-sea training; or 36 months sea service as GP rating including 18 months sea service in the Deck Department after holding certificate of proficiency as navigation watch rating;
  - (g) Qualified in oral examination conducted by the Department
- (5) For Certificate of proficiency as Ship Cook any person shall comply with following requirements:-
- (a) Age not less than 19 years;
  - (b) 12 months approved sea service along with 6 months cooking experience at ship's saloon department;
  - (c) Minimum S.S.C. pass and Trade Certificate or Diploma in Cooking from any approved merchant marine training institute or Bangladesh Tourism Corporation or any internationally reputed hotel;
  - (d) Medical examination and eye test certificate as per rule 25;
  - (e) Basic training course certificates as per rule 11(2); and-
  - (f) Qualified in Ship's Cook Examination conducted by the department.

**21. Certificate of proficiency as engineering watch rating and other certificates.** - (1) Each rating, involved with engineering watch of ships of 750 KW or more main propulsion power, shall hold a Certificate of proficiency as engineering watch rating.

- (2) For Certificate of proficiency as engineering watch rating under sub-rule (1), any person shall comply with following requirements:-
- (a) Age not less than minimum 16 years;
  - (b) Minimum Secondary School Certificate or equivalent from any recognised board;
  - (c) Minimum 12 months sea-service with at least 6 months' training and experience in Engine Department or minimum three months' sea service along with any approved engine rating pre-sea training; Sea services referred above shall be related to engineering watch keeping duties under the supervision of chief engineer officer or engineering watch keeping officer holding certificate of competency / qualified engine rating on board foreign going merchant ships.
  - (d) Any approved engineering watch rating training course and qualified in related Examination;
  - (e) Shall have Medical examination and eye test certificate as per rule 25;
  - (f) Basic training course certificates as per rule 11(2).

- (g) Qualified in oral examination conducted by the Department.
- (3) Any Engine Cadet shall comply with the following requirements for certificate of proficiency as Engineering Watch Rating:-
- (a) Not less than minimum 18 years of age;
  - (b) Minimum 6 months approved sea service as Engine Cadet or three months sea service as engine cadet with approved pre-sea training;
  - (c) Higher Secondary School Certificate or equivalent with physics and mathematics from any recognised board;
  - (d) Shall have Medical examination and eye test certificate as per rule 25;
  - (e) Basic training course certificates as per rule 11(2).
  - (f) Qualified in Engineering Watch Rating Examination conducted by the department.
- (4) Able Seafarer Engine rating of ships of 750 KW or more main propulsion power, shall hold a Certificate of proficiency as Able Seafarer Engine in compliance with following requirements, viz:-
- (a) Age not less than 18 years;
  - (b) certificate of proficiency as Engineering Watch Rating;
  - (c) Any approved Able Seafarer Engine rating training course and passed in the related Examination;
  - (d) Certificate of Proficiency in Survival Craft and Rescue Boat;
  - (e) Medical examination and eye test certificate as per rule 25;
  - (f) After holding certificate of proficiency as engineering watch rating 12 months sea service in the Engine Department with any approved Engine rating pre-sea training; or 36 months sea service as GP rating including 18 months sea service in the Engine Department after holding certificate of proficiency as engineering watch rating;
  - (g) Qualified in oral examination conducted by the Department
- (5) Electro-Technical rating of ships of 750 KW or more main propulsion power, shall hold a Certificate of proficiency as Electro-Technical rating in compliance with following requirements, viz:-
- (a) Age not less than 18 years;
  - (b) Any approved Electro-Technical rating training course and passed in the related Examination;
  - (c) Basic training course certificates as per rule 11(2).
  - (d) Medical examination and eye test certificate as per rule 25;
  - (e) At least 6 months approved sea service with approved training / minimum 3 years duration diploma in electrical engineering; or at least 12 months approved sea service with at least 6 months training and experience in engine department; or at least 6 months approved sea service with approved electro-technical rating pre-sea training; and,
  - (f) Qualified in oral examination conducted by the Department
22. **Preservation of data related to certificates, etc.** - (1) Director General shall preserve all data relating to all certificates issued including endorsement, revalidation, return, Cancellation, lost and replacement made under these rules.
- (2) Any person, obtaining higher grade certificate of competency under these rules, he shall return previous grade certificate of competency to the Director General.



- (3) Certificate referred to under sub-rule (1) shall remain valid subject to maintaining the professional standard and medical fitness specified under these rules.
23. **Issuance of duplicate certificate in case of lost or damaged:** - The Director General may issue duplicate certificate upon application by the concerned person and on payment of fees specified by the government against lost or damaged or deformation of any certificate issued under these rules.
24. **Certificate Endorsement.** - Director General shall endorse all certificates issued under these rules.
25. **Medical fitness, eye Examination and review of medical certificate.** - (1) For the purpose of service on board ship or obtaining certificate of competency or revalidation, each candidate shall have medical fitness as specified by the Director General and shall obtain certificate in this regard from any approved medical practitioner recognized by the Director General.
- (2) Every candidate for medical fitness certificate shall comply with following requirements, viz:-
- (a) Age not less than 16 years;
  - (b) Submit CDC, passport, national identification card, or any approved evidence for satisfactory determination of candidate's identity;
  - (c) Candidate shall meet the approved medical fitness standard.
- (3) Validity of medical fitness certificate shall be of two years unless the candidate is under the age of 18, in which case the maximum period of validity shall be one year and medical Examination shall be as per standard prescribed in the convention.
- (4) Based on medical condition and functions to be performed, any recognized medical practitioner can issue medical fitness certificate for a lesser term than the above period.
- (5) If any recognized medical practitioner refuses to issue medical fitness certificate or issues medical fitness certificate with sea service or geographical limitation, in that case, the recognized medical practitioner shall inform the candidate the reason by written notice.
- (6) If any candidate is not satisfied with the decision of the recognized medical practitioner under sub-rule (5), the candidate may appeal in writing to the Director General not exceeding 30 days of such decision.
- (7) On receiving application for appeal under sub-rule (6) by the Director General, shall refer the candidate to another recognized medical practitioner for review and the Director General shall give final decision taking into consideration the decision of such medical practitioner.
- (8) If any recognized medical practitioner categorically deems that the decision of issuance of medical fitness certificate to any candidate needs to be reviewed or suspended, he shall inform the candidate and Director General by written notice.
- (9) The Director General on receiving notice under sub-rule (8);
- (a) Shall suspend the validity of the certificate until re-examination of medical fitness; or
  - (b) Shall suspend the validity of certificate as long as he deems the candidate shall be unfit for sea service; or

- (c) Shall cancel the certificate if the candidate is permanently unfit for sea service.
- (10) For every certificate of competency and for medical fitness for joining ship for the first time, any candidate has to be qualified in eye sight and colour vision Examination conducted by the Department of Shipping as per standard specified in the convention. Certificate of qualifying eye Examination shall be valid not more than two years.
- 26. Dispensation.** - (1) The Director General or his authorised officer, in circumstances of exceptional necessity, grant dispensation to any officer having sufficient experiences and holding certificate of competency sufficient to fill up the post of one level below for any post except Master and Chief Engineer for a specified period not exceeding six months.
- (2) For issuance of dispensation certificate, application has to be submitted to the Director General or Chief Examiner along with fees specified by the government.
- (3) For obtaining dispensation certificate, candidate has to be qualified in the oral Examination conducted by the Department for this purpose.
- 27. Approval of Merchant Marine Training Institute, Assessment of training and maintaining Quality Standard System.** - (1) Director General or any officer nominated by him, shall supervise/monitor the training and assessment of the approved institute as per proper provisions of the Convention.
- (2) For the purpose of evaluation of training of the approved institute and its assessment and for supervision/monitoring work under sub-rule (1) every five years, Government, through gazette notification, shall form a committee comprising of required number of experienced experts and professionals who are not involved with training programme under these rules.
- (3) Committee, formed under sub-rule (2), shall submit a report to the government pertaining to its assessment every five years.
- (4) Merchant Marine Training Institute shall be approved by the government and all maritime courses conducted for the purpose of these rules shall be approved by the Department.
- (5) (a) There shall be Quality Standard System in all Merchant Marine Training Institutes under the Department of Shipping.
- (b) All trainings, examinations, certification, endorsement and revalidation of certificates conducted by the Department under these rules shall be governed by Quality Standard System.
- 28. Working hours and fitness for duty.** - (1) There shall be specified working hour under these rules for every master, officer and rating engaged on board ship.
- (2) Every company itself or in consultation with recruiting agency, in case the company itself is not recruiting authority shall fix working hour under sub-rule (1) and shall display the working hour table on-board ship in a conspicuous space.
- (3) At the discretion of the company, responsibility of fixing working hour under sub-rule (2) can be given to any recruiting agency.

- (4) In the working hour table, time limit of maximum continuous watch keeping duration, minimum rest hour in the interval of two watch keeping duty and daily, weekly and monthly working hours shall be specified.
  - (5) Working hours shall be fixed on the basis of following principles, viz:-
    - (a) During every 24 hours, minimum 10 hours shall be reserved for rest;
    - (b) Rest hour under article (a) may be divided into two parts so that one part consists of not less than 6 hours and the intervals between two successive periods of rest shall not exceed 14 hours;
    - (c) Minimum 77 hours a week shall be reserved for rest;
    - (d) Working hours of Master, Chief Engineer, Chief Mate and Second Engineer shall be fixed in such a way that safe operation of ship is not hampered.
  - (6) Subject to the requirement of these rules, any company or recruiting agency may change or amend the time table of working hours.
  - (7) Information pertaining to the violation of the requirement of these rules in fixation of working hours shall be preserved with the company or master of the vessel for at least five years from the date of violation.
  - (8) Despite anything contained in these rules, in circumstances stated in the convention and in the event of any emergency concerning safety of the vessel, these rules shall not be applicable.
- 29. Watch keeping and Voyage Planning.** - (1) Master and Chief Engineer shall prepare their voyage Plan according to the directives of the Director General.
- (2) Master and Chief Engineer shall ensure safe navigation and engineering watch keeping of ship at sea and safe watch keeping at port or anchorage.
  - (3) Master shall order Deck Officers and the Chief Engineer shall order engineer officers for safe operation of the ship according to the directives of the Director General.
- 30. Watch keeping system at port for ships carrying hazardous goods.** - During the stay at port or anchorage of ships carrying hazardous goods, Master, shall adopt following watch keeping arrangements, in addition to the arrangements stated in rule 29, viz:-
- (a) While the vessel is carrying such hazardous bulk cargo which may cause accident, one or more officers holding certificate of competency shall ensure safe port watches and ensure the presence of necessary ratings on-board ship.
  - (b) If there is other hazardous cargo on vessel other than bulk, due regard shall be given to the type, quantity, packing and special condition of ship and port, safe watch keeping shall be ensured.
- 31. Responsibilities of Company, Master, Officers and ratings.** – (1) Every company shall ensure the following matters:-
- (a) Each officer and ratings recruited in the vessel shall hold certificate of competency / proficiency as per these rules;
  - (b) The ship is manned as per minimum Safe manning Document issued by the Director General;
  - (c) Antecedents and experience certificates, training, medical fitness certificates and certificates of competency and proficiency of officers and ratings are properly preserved.

- (d) All seafarer's working in the ship is familiar with the internal arrangements and characteristics of the vessel;
  - (e) All concerned on-board are able to cooperate each other in prevention or mitigation of marine pollution or during emergency or safety operation.
- (2) Each company shall provide written instructions to the Master of the Vessel setting out their policy and procedures to ensure that all concerned may be familiar with equipments, operating procedures and other arrangements.
- (3) Master shall designate a competent person to inform policy and procedure stated in sub-rule (2) to the newly employed officers and ratings in a language the seafarer understands and shall preserve the data in a file.
32. **Prohibition to proceed to sea.** - No vessel shall be allowed to proceed to sea without compliance with any IMO Convention or these rules.
33. **Inspection of Foreign Flag Vessel:-** Any person authorised by the Director General shall be entitled to inspect any foreign flag vessel arrived at the territorial waters of Bangladesh to determine compliance with the convention.
34. **Conversion from Radio Officer to Deck Officer.** - Any Radio Officer holding Radio Communication General Operator Certificate issued under these rules or its equivalent shall be entitled to Deck Officer Class-3 Certificate of Competency subject to compliance with the following requirements, viz:-
- (a) Shall have at least three years sea service on any vessel as Radio Officer;
  - (b) shall have further 18 months sea service in addition to the term referred to in article (a) and during this period, shall complete all specified training and assessment including 6 months' Bridge Watch keeping as per approved Training record Book (TRB) for Deck Cadets under the supervision of Master and Chief Officer; or
  - (c) shall have further twelve months Sea service as Non –watch keeping Radio Officer in addition to the term referred to in article (a) and during this period, shall complete all specified training and assessment including 6 months' Bridge Watch keeping as per approved Training record Book (TRB) for Deck Cadets under the supervision of Master and Chief Officer;
  - (d) Sea Service described in article (b) and (c) shall be completed under the supervision of Master and Chief Officer holding appropriate certificate of competency.
  - (e) Shall comply with other requirements described in clause 3 of appendix- 3.
35. **Conversion from Marine Electrical Engineer to Marine Engineer Officer.** - Any Marine Electrical Engineer holding Marine Electro-Technical officer Certificate issued under these rules or its equivalent, shall be entitled to Marine Engineer Officer Class-3 Certificate of Competency subject to compliance with the following requirements:-
- (a) Shall have at least three years sea service on any vessel as Marine Electrical Engineer or Junior Marine Electrical Engineer;
  - (b) Shall have further 18 months sea service in addition to the term referred to in article (a) as Marine Electrical Engineer or Junior Marine Electrical Engineer and during this period, shall have to complete all specified training and assessment including 6 months' Engine Watch keeping as per approved Training record Book (TRB) for Engine Cadets under the supervision of Chief Engineer and Second Engineer Officer;

- (c) Sea Service described in article (b) shall be completed under the supervision of Chief Engineer and Second Engineer Officer holding appropriate certificate of competency;
- (d) Shall have 6 months' Mechanical Workshop training from any recognised workshop and it shall be supported by training record book; and
- (e) Shall comply with other requirements described in clause 3 of appendix-4.

**36. Qualifications and Experiences of Chief Examiners, Examiners and Instructors.** - (1) Qualifications and experiences of the examiners engaged in conducting certificate of competency examinations of Deck Officers and Marine Engineer Officer shall be as follows:-

- (a) Examiner responsible for conducting Deck Officer Certificate of Competency Examination shall hold Deck Officer Class-1 (Master Mariner) Certificate of Competency and shall have experience as Master of foreign going vessel;
  - (b) Examiner responsible for conducting Marine Engineer Officer Certificate of competency Examination shall hold Marine Engineer Officer Class-1 (Chief Engineer) Certificate of Competency and shall have experience as Chief Engineer Officer of foreign going vessel;
  - (c) Examiner for conducting examination on subjects concerning practical training, shall have the practical experiences of discharging responsibilities on board ship in the related matter; and,
  - (d) Shall hold certificate of 'Proficiency in Maritime Training and Assessment'.
- (2) Qualification of the Chief Examiner: - Qualifications and experiences of the Chief Examiners responsible for conducting and controlling Deck Officer and Marine Engineer Officer Certificate of Competency Examination shall be as follows:-
- (a) Shall have to fulfil the pre-requisites of discharging responsibilities of Examiner as per sub-rule (1);
  - (b) Shall have at least 1 year's experience as Examiner.
- (3) Qualification and Experiences of the instructors responsible for Maritime Training. - Qualification and experience of professional instructors shall be similar to qualifications and experiences of the examiners specified in sub-rule (1) above and other instructors shall have proper qualification and experience in related subjects.

**37. Recruitment of Deck Cadet and Engine Cadet.** - For training and recruitment of Deck Cadet and Engine Cadet on board ship, following requirements shall be complied with:-

- (a) Age minimum 18 years and maximum 25 years;
- (b) Shall have to obtain First Division/ 60% marks/ GPA 3.50 in S.S.C. and H.S.C. examination in Science group and shall have to obtain First Division/ 60% marks/ GPA 3.50 in H.S.C. Examination. with Physics and Mathematics and has to secure 60% marks individually in Physics and Mathematics and 50% marks in English; in case of shortage of 50% marks / GPA 3.00 in English, shall have score of 5.5 in IELTS; or
- (c) Shall have to obtain at least C grade with Physics and Mathematics in A-level examination and C grade with at least 5 subjects including Physics, Mathematics and English in O-level examination under English Medium Curriculum;
- (d) In case of other candidates except Marine Academy cadets, shall have appointment letter from the ship owner/ company before joining training.

- (2) Candidates have to obtain medical fitness certificate, eye test and colour vision fitness certificate, hearing fitness certificate from any recognized medical practitioner and shall have satisfactory police verification report at the time of issuance of CDC from Government Shipping Office, Chittagong. However, in case of issuance of CDC of any candidate holding Pre-Sea Training Certificate from any Merchant Marine Training Institute, if the institute procures satisfactory police verification report, any new police verification shall not be required.
- (3) Shall have to complete at least 6 months foundation pre-sea training course prior to joining on board ship from any approved merchant marine training institute for candidates other than marine academy cadets.

**38. Use of Simulator in Maritime Training and Certification Examination:-** Approved simulator has to be used in Maritime Training Institutes or Certificate of competency Examination activities according to applicable requirements of STCW Convention/ Code/IMO Model Course. Instructors and examiners shall have to be duly qualified and experienced in the use of simulator used for training and examinations in Maritime Training and Certificate of competency Examinations.

**39. Repeal and savings.** - (1) As these rules comes into force, following rules shall thereafter be called as repealed rules and is hereby repealed, viz:-

- (a) Bangladesh Merchant Shipping (Certification of Deck Officer) Rules, 1991;
- (b) Bangladesh Merchant Shipping (Certification of Marine Engineer Officers) Rules, 1990;
- (c) Bangladesh Merchant Shipping (Recruitment, Training and Certification of Deck Ratings and Saloon Ratings) Rules, 1991;
- (d) Bangladesh Merchant Shipping (Recruitment, Training and Certification of Engine Ratings) Rules, 1991; and-
- (e) Bangladesh Merchant Shipping Officers and ratings Training, Certification, recruitment, working hours and watch keeping rules, 2000.

(2) Despite above repeal, issued under the repealed rules –

- (a) Navigation Watch Rating Certificate, Engineering Watch Rating Certificate and ships cook certificate shall be deemed as Certificate of Proficiency as Navigation Watch Rating, Certificate of Proficiency as Engineering Watch Rating and Certificate of Proficiency as ships cook respectively issued under these rules and those shall remain valid under the provision of the rules.
- (b) Previously issued Deck Officer Certificate of Competency and Engineer Officer Certificate of Competency shall be deemed as equivalent certificates issued under these rules mentioned against them, viz:-

<b>Deck Officer/Engineer Officer Certificate of Competency issued under repealed rules</b>	<b>Deck Officer/Engineer Officer equivalent Certificate of competency issued under these rules</b>
5 <sup>th</sup> Class Deck Officer	Deck Officer Class-5 (Near Coastal Mate)
Coastal Master/ 4 <sup>th</sup> Class Deck Officer	Deck Officer Class-4 (Near Coastal Master)
Deck Officer Class 3/ 3 <sup>rd</sup> Class deck officer (2 <sup>nd</sup> Mate)	Deck Officer Class-3 (2 <sup>nd</sup> Mate)

Deck Officer Class-2/ 2 <sup>nd</sup> Class deck officer (Chief Mate)	Deck Officer Class-2 (Chief Mate)
Deck Officer Class 1 (Master Mariner)/ 1 <sup>st</sup> class deck officer (Master Mariner)	Deck Officer Class 1 (Master Mariner)
	Marine Engineer Officer Class-5 Marine Engineer Officer Class-4
Marine Engineer Officer Class-3/3 <sup>rd</sup> Class Engineer (3 <sup>rd</sup> Engineer) Officer	Marine Engineer Officer Class-3 (3 <sup>rd</sup> Engineer Officer)
Marine Engineer Officer Class-2/2 <sup>nd</sup> Class Engineer (2nd Engineer) Officer	Marine Engineer Officer Class-2 (2nd Engineer Officer)
Marine Engineer Officer Class 1/1 <sup>st</sup> Class Engineer (Chief Engineer officer)	Marine Engineer Officer Class 1 (Chief Engineer)
Electrical Engineer Officer	Marine Electro-Technical Officer

- (c) Persons holding Deck Officer Certificate of Competency and Marine Engineer Officer Certificate of Competency, on application to the Director General with fees ascertain by the government, shall be entitled to equivalent certificate under these rules, but the candidates shall have to comply with the applicable requirement of the respective grade under these rules.

## Appendix-1

### [Vide Rule 2(w)]

#### Method of Counting Sea-Service

1. (a) Sea-service shall be counted under following method, viz:-
  - (i) From the date of sign on to the date of sign off from the same vessel (including both dates);
  - (ii) Sea service shall be counted according to calendar month; hence, one month shall mean the period from the date of any month to the preceding day of that date of next month (Including both days);
  - (iii) Days remaining (if any) after counting full month from date of beginning of sea service, shall be added as number of day;
  - (iv) Adding days of sea service of various periods, 30 days will make a month;
- (b) Sea service during employment means:
  - (i) Total period in case of vessel deployed in international voyage;
  - (ii) Half of the total period in case of vessel engaged in lighterage, but it shall not be counted more than six months; and-
  - (iii) Half of the total period in case of vessel waiting for repair or next deployment, but not be counted more than three months;
- (c) In order to obtain Deck Officer Class-1 and Class-2 certificate of competency, period of regular service completed as Navigating Watch keeper on board ship of more than 3000 GT engaged on international voyage shall be counted as Sea-service; Without required sea service on board ship stated above, Deck Officer Class -1 and Class -2 certificates shall be endorsed with limitation for less than 3000 GT.
- (d) In order to obtain Engineer Officer Class-1 and Class-2 certificate of competency, period of regular service completed as Engineering Watch keeper on board ship of more than 3000 KW engaged on international voyage shall be counted as Sea-service; Without required sea service on board ship stated above, Engineer Officer Class -1 and Class -2 certificates shall be endorsed with limitation for less than 3000 KW.
- (e) For other certificates except Deck Officer Class-1, Class-2 and Class-3 certificates of Competency, service done at the following ships shall be counted as service equivalent to Merchant Ship, viz:-
  - (a) Offshore unit and supply vessel plying between Chittagong or Mongla sea port;
  - (b) Coastal merchant ships;



**Appendix-2**  
**[Vide rule 3(a)]**  
**Department of Shipping**  
**Syllabus for Certificate of Competency Examination**

Syllabus of this appendix is provided only for General Knowledge of the candidates; it does not mean that question papers shall only be confined within this syllabus. Questions shall be prepared as per Convention, respective model courses and updated with the development of ship industry and technology. In addition, Director General may amend/ revise the syllabus from time to time with the amendments of the convention, IMO model courses and updated with the development of ship industry and technology.

**Deck Officer Class-4 and Class -5**

**A. Written Examination (For deck Officer Class-5):**

**Subject-1: Navigation**

- a) Determining ships position in conditions use of Compass course, variation, deviation, and distance recorded at log, estimated speed, affect of wind and tide, etc.
- b) Determining true course by applying deviation variation to magnetic compass course or determining true course from gyro course by applying gyro error and vice-versa. Determining deviation from deviation card, determining magnetic course from true course by applying it, and determining compass course between two positions. Affect of current on ships speed. Application of leeway. Determining true course and speed by applying compass course, ships speed, direction and speed of current. Determining course to steer by applying affect of current. Determining set rate of the current from steered course and distance between two points. Determining ship position under any circumstance.
- c) Determining position on navigational chart applying necessary correction by simultaneous two bearing, bearing and distance, position information received through radio aids or their combination. Use of lattice Chart.
- d) Determining position applying affect of current along with run from bearing of one or more objects and determining distance of the ship from a certain point. Use of transit bearing.
- e) Determining convenient anchorage. Arrival at narrow channel and anchorages. Use of horizontal and vertical angles. Determining distance of visible light.
- f) Determining height and time of low and high tide.
- g) Beaufort wind scale. Means of determining direction and speed of wind at sea considering the influencing factors on the sea states. Monsoon climate.
- h) Knowledge of weather forecast broadcast by meteorological department for ships navigation. Coding decoding of message using code, decode book. Knowledge about weather reporting systems.

**Subject-2: Shipboard Operation and stability**

- (a) General idea about shipbuilding and various plans kept on board ship.
- (b) General definitions of principal dimensions.
- (c) Name of principal parts of a ship.
- (d) Candidates shall be practically introduced with following equipments and structural parts:  
Horizontal and transverse frame, beam and beam knees; water resistant bulkhead; Hatchway and its securing arrangement; Rudder; Steering gear; Propeller and propeller shaft; sounding pipe; air pipe.
- (e) Meaning of the following terms:  
Block Co-efficient, Displacement and Deadweight.
- (f) Density, Relative density, Archimedes principle; Affect of water density on draught and freeboard; Fresh water allowance.
- (g) Care and maintenance of all life saving appliance, fire extinguishing appliance, light and sound signalling appliances.
- (h) Determining displacement of ship from draught and freeboard and weight of cargo ballast, etc. using TPC (Tonnes per centimetre). Load line mark. Buoyancy and reserve buoyancy.
- (i) General knowledge about following terms: viz,  
Centre of gravity, Stable, Unstable and Neutral equilibrium, centre of Buoyancy, Metacentric height, Righting Lever, Righting moment.
- (j) Use of Hydrostatic and stability information provided to ship. Affect of addition and subtraction of weight or cargo. Use of rigging, derrick, winch and crane for loading and discharging cargo on/from vessel. Line up of pipelines on oil tanker. Ventilation system of cargo hold and required precautionary measures before entry into cargo, ballast tank and void space.
- (k) Code, rules and practical knowledge about safe loading, stowage lashing, discharging of cargo from the vessel.

**B. Signalling Examination (for deck Officer Class-5):**

- (a) Sending and receiving signal: Morse code by flash lamp, six sounds per minutes.
- (b) International Code of Signals.

**C. Oral Examination (for deck Officer Class-5):**

Candidates have to be well conversant in the following topics:-

1. Navigation

(1) Safe Navigation

- (a) Prepare knowledge about principle watch keeping at sea including port, anchorage and pilotage operation. Use of ECDIS and its limitation. Blind pilotage technique. Safe navigation using navigational aids.
- (b) Complete knowledge about international regulation for preventing collisions at sea and purpose and application of annexes regarding safe navigation in fog, at night and daytime (Candidates shall not be asked to navigate sailing vessel or boat, but shall

have proper knowledge about light shown by those vessels and navigation according to direction of wind.)

- (c) IALA Buoyage system. Use of VTIS
  - (d) Navigational Chart and publication, sailing direction, tide table, Notice to Mariners, Radio navigational warning, Routing information.
  - (e) Knowledge about echo-sounder and bridge equipment.
  - (f) Use, care and limitations of Magnetic and Gyro Compass including Autopilot.
  - (g) Operation of Automatic Steering Control System and knowledge of change over from manual to automatic and automatic to manual.
  - (h) Determination and use of azimuth and compass error and use of pelorus and bearing plate and other bearing measurement equipments.
  - (i) Use of sextant in measurement of horizontal and vertical angles. Determining reading of sextant on the arc and off the arc. Determination of index error of sextant.
  - (j) Correction of sextant with error of perpendicularity, side error and index error.
  - (k) Reading of Barometer and Thermometer.
  - (l) Comparison, maintenance, winding and determination of rating of chronometer.
  - (m) Proper knowledge about use of distress signal and penalty for misuse.
  - (n) Emergency communication system under G.M.D.S.S. regulation.
- (2) Response during emergency:-
- (a) Initial action following collision, grounding, flooding or major mechanical damage. Control and assessment of initial damages. Preservation of marine environment.
  - (b) Man overboard procedures.
  - (c) Assistance to ship in distress, responding during emergency at port.
  - (d) Precaution for safety and safeguarding of passengers during emergency.
  - (e) Emergency and distress signals, international code of signal. Standard Marine navigational vocabulary of International Maritime Organization.
- (3) Ship Manoeuvre
- (a) Preparation for departure and sailing; preparation before port arrival, berthing at port, entry into dock, berthing at jetty or alongside other vessels, making fast with buoy.
  - (b) Effect of propeller on steering of ship, stopping, going astern, interaction with other ships. Squat, manoeuvring in the vicinity of other ships and pilot boats, embarkation and disembarkation of pilots, turning short round. Anchoring during emergency.
  - (c) Faults of Bridge equipments. Failure of bridge control or telegraph. Emergency steering system.

## 2. Cargo handling and stowage

- (1) Supervision of cargo loading and discharging
- (a) Use and maintenance of wire rope and synthetic fibre, determination of safe working load.
  - (b) Basic knowledge about regulations and recommendations regarding cargo handling stowage, securing and maintenance. Knowledge on IMDG code and its use.

- (c) Use of Hydrometer, Hygrometer and other related apparatus.
- (d) Precautions taken before entering to void space, ballast tank and cargo space.
- (2) Supervision of Cargo Stowage, Securing and maintenance
  - (a) Knowledge about IMO code of safe practice for cargo stowage and securing.
- 3. Shipboard Operation
  - (1) Compliance with pollution prevention requirements
    - (a) Precautions taken for prevention of pollution of marine environment as per the requirements of MARPOL Convention, Disposal of polluting substance.
    - (b) Basic knowledge on anti-pollution equipments.
  - (2) Maintaining seaworthiness
    - (a) Name of major parts of structure of vessel and actual name of various parts.
  - (3) Control and Response of Fire extinguishing on board ship
    - (a) Fire extinguishing: Use and maintenance of various equipments for fire extinguishing. Breathing apparatus and emergency escape. Response and actions at shipboard fire caused by oily substance. Organise emergency team and drill.
  - (4) Operating Life saving appliance
    - (a) Use and maintenance of life saving appliance, launching and recovery of lifeboats and rescue boats.
    - (b) Basic principles of surviving at sea.
    - (c) Search and rescue arrangement at the Bay of Bengal.
    - (d) Meanings of markings on lifeboat and related apparatus.
  - (5) Knowledge about legislative requirements
    - (a) Knowledge about Code of Safe Working Practice for safety of Merchant seaman, Admiralty notices to Mariners.
    - (b) Knowledge about Bangladesh Merchant Shipping Ordinance, 1983.
    - (c) Application and objectives of I.S.M. Code.
    - (d) Port State Control.
  - (6) Knowledge about leadership and management skill

**D. Oral Examination (for Deck Officer Class-4):**

- 1. Navigation
  - (1) Safe Navigation
    - (a) Magnetic Compass-Variation and Deviation, Cause and effect: How to use: Sitting Magnetic Compass.
    - (b) Knowledge about VTIS and port operation.
    - (c) Knowledge about general principles of ship routing according to principles of Ship Reporting System.

- (d) Ability for analysis of Synoptic Chart and weather forecast.
- (e) Use and limitations of ECDIS. Safe navigation using navigational aids.
- (2) Response during emergency
  - (a) Initial actions following collision, grounding, flooding or major mechanical damage. Control and assessment of initial damages. Preservation of marine environment.
  - (b) Actions when in danger and disabled, abandoning disabled and distress ship and means of survival.
  - (c) Towing of own ship by other ship and towing of other ship.
  - (d) Safety of Helicopter Operation.
  - (e) Knowledge about IAMSAR Manual.
- (3) Ship Manoeuvring:
  - (a) Effect of wind and current; Deadweight, draught, trim, speed and under keel clearance, interaction with other vessels.
  - (b) Ship berthing and un-berthing with tug and without tug, with current and without current at jetty, mooring buoy and single point mooring.
  - (c) Ship management in heavy weather.
- 2. Cargo Handling and Stowage:
  - (1) Supervision of cargo loading and discharging
    - (a) Maintenance and use of all kinds of Deck machinery and cargo handling equipment.
    - (b) Precaution during loading and discharging of deck cargo, dry bulk cargo, liquid cargo, ore cargo and heavy lift using ships or port gears.
    - (c) General knowledge about oil tanker and its operation.
    - (d) Use of Hydrometer and Hygrometer including other related equipments.
  - (2) Supervision of Cargo stowage, securing and maintenance
    - (a) Knowledge about IMO code of safe practice for cargo stowage and securing.
    - (b) Action in case ship board pollution or marine pollution.
    - (c) Basic knowledge on anti-pollution equipments.
  - (3) Maintaining seaworthiness of ship
    - (a) Necessary preparation for prevention of water ingress into vessel during heavy weather.
    - (b) Necessary measures in case of water ingress into vessel, fall of cargo from deck, damage of hull and hatch, cargo shifting.
    - (c) General procedures and precautions for preparedness for dry docking with or without cargo, use of bilge block, shoring etc.
    - (d) Use and maintenance of all equipments on the deck including winch, capstan, windlass, davit, fairlead, anchor and fittings used in chain locker.
    - (e) Anchoring: Different types of anchor and their advantage and disadvantage, preparation for anchoring, anchoring with single anchor and use of second anchor.

- (f) Anchoring with current and in a narrow place. Hanging of anchor, dismantling anchor chain, leaving anchorage.
- (4) Control and prevention of fire on board:
  - (a) Fire extinguishing: Use and maintenance of fire extinguishing equipments. Breathing apparatus and emergency escape.
  - (b) Response and actions during fire on board including oil fire: Organise emergency team and drill.
- (5) Operating life saving appliances
  - (a) Launching, recovery and operation of life boat, beaching and landing lifeboat, ensuring survival on lifeboat.
- (6) Legislative knowledge
  - (a) Certificates required for Bangladesh ships; method of obtaining certificates including validity, survey, periodical survey.
  - (b) Knowledge about load line mark; report on freeboard, draught and allowances and writing log book.
  - (c) Legal requirements for drill and training.
  - (d) Port estate control.
  - (e) Application of IMS Code.
- 3. Knowledge of leadership and management skill.

### **Deck Officer Class-3**

#### **A. Written Examination:**

##### **Subject: 1 General Ship Knowledge**

- (a) General idea about shipbuilding and plans kept on board ship:
  - General definitions of principal dimensions.
  - Name of major parts of ship.
  - Candidates shall be practically introduced with following equipments and structural parts:
    - Horizontal and transverse frame, beam and beam knees; water tight bulkhead; Hatchway and its closing equipment; Rudder; Steering gear; hull and deck plating, double bottom and peak tank; bilges; side and wing tank, Stern Frame, Propeller and propeller shaft; stern tube; sounding pipe; air pipe; General pumping arrangement; Strengthening for Panting pounding and longitudinal stresses; Cause of corrosion on ships structure and its prevention.
- (b) General knowledge on welding, riveting and hot work and precautionary measure during its operation.
- (c) Meaning of following terms:
  - (i) Block Co-efficient, displacement and deadweight.

- (ii) Density, Relative density, Archimedes Principle; Affect of water density on draught and freeboard; Fresh water allowance.
- (d) Use and maintenance of all kinds of life saving appliances, fire extinguishing equipments, light and sound signalling apparatus.
- (e) Determining area using Simpson's first and second rule.
- (f) Inspection and reporting regarding problems and damages of cargo space, hatch cover and ballast tanks in bulk carrier and others ships.

**Subject-2: Cargo Operations & stability**

- (a) Displacement of ship from draught and freeboard and determining weight of cargo, ballast, etc using TPC (Tonnes per centimetre) scale. Load line marks. Buoyancy and reserve buoyancy, measures to be taken in case of partial loss of reserve buoyancy.
- (b) (i) General knowledge about the definition of following terms, viz:-
  - Centre of gravity, Stable, Unstable and Neutral equilibrium, Centre of Buoyancy, Metacentric height, Righting Lever, Righting moment.
- (ii) Use of Hydrostatic and stability information provided to ship. Effect of addition and subtraction of weight or cargo. Hazards involved in partially filled tank. Safety of cargo hold.
- (iii) Use of rigging, derrick, winch and crane for loading and discharging of cargo to/from vessel. Line up of pipelines on oil tanker. Separation, stowage and dunnaging of bulk cargo, timber cargo, grain cargo, ro-ro cargo and other cargoes. Cause of sweating and necessary precautions for prevention of damage of cargo from sweating before, and after loading, during voyage. Knowledge about safety measures during loading and discharge of hazardous cargo, chemical, bulk oil, etc. Calculation of space partially occupied by cargo and void space. Determination of dimension of cargo from weight and weight from dimension. Making and use of cargo plan. Ventilation system of cargo hold and tank. Required precautionary measures before entry into cargo, ballast tank and void space. Transportation of passenger and livestock.

**Subject- 3: Ocean and Offshore Navigation**

- (a) Practical problems of Mean Latitude and Mercator sailing.
- (b) Determining ship position under any circumstance, Use of Compass Course, Variation, Deviation, Distance recorded in log, Estimated Speed, Affect of wind and current, etc.
- (c) Determining latitude by measuring angular distance of the sun, the moon and stars at the Meridian above and below the pole; determining latitude by Polaris.
- (d) Determining direction and position line with the measurement of angular distance of the sun, the moon and stars near the Meridian.
- (e) Determining position with two or more angular distance and zenith distance with or without run.

- (f) Determining True Bearing of heavenly body and determination of error of compass and deviation and variation in magnetic compass.
- (g) Determining time of passing meridian of heavenly body and determining angular distance while crossing meridian for use in sextant.
- (h) Great circle and composite great circle sailing. Use of Gnomonic Chart.
- (i) Determining position, Systematic and random error and their effects. Probability area, determining position through any two kinds of observation with or without run.

#### Subject- 4: **Coastal Navigation**

- (a) Determining true course applying deviation variation to magnetic compass course or determining true course from gyro course applying gyro error and vice-versa. Determining deviation from deviation card, determining magnetic course from true course applying it, determining compass course between two positions. Affect of current on speed of vessel. Application of leeway. Determining true course and speed applying compass course, ships speed, direction and speed of current. Determining course to steer applying affect of current. Determining set and rate of current from steered course and distance between two points.
- (b) Determining position on navigational chart applying necessary correction with two simultaneous bearing and with bearing and distance, position information received through radio aids or their combination. Use of Lattice Chart.
- (c) Determining position applying affect of current with run from bearing of one or more objects and determining distance of the ship from a certain point. Use of position line and position circle determine by terrestrial methods. Use of transit bearing.
- (d) Basic knowledge and application of passage planning. Landfall in clear and restricted visibility. Determining suitable anchorage. Arrival at narrow channel and anchorage. Use of horizontal and vertical angles. Determining distance of visible light house.
- (e) Determining time and height of high and low tides.

#### Subject-5: **Meteorology**

- (a) Use of formulae for Pressure measurement and standard datum. Knowledge about Aneroid and Precision Aneroid barometer and Barograph.
- (b) Determining sea water and air temperature and precautions to be taken. Theory of hygrometer, determining relative humidity. Care and maintenance of equipments.
- (c) Beaufort Wind Scale. Method of determining wind direction and speed at sea taking into consideration of factors affecting the sea state.
- (d) Knowledge about global mean pressure distribution. Daily and seasonal variation of air pressure. Prevailing wind. Local and regional effect of heating and radiation, land breeze and sea breeze, monsoons, katabatic wind.
- (e) Features of major pressure systems and related weather, viz, Anti cyclone, depression, permanent and semi-permanent high pressure and low pressure. Relationship between wind and pressure system. Air Masses and its characteristics. Buys Ballot's law.
- (f) Use of weather criteria with atmosphere pressure measured by Barometer at a station.



- (g) Water vapour in the atmosphere, evaporation, condensation, rain. Meaning of saturations, relative humidity, and dew point. Basic knowledge about atmospheric stability, lapse rate, formation and classification of cloud, fog, mist, dew and haze.
- (h) Knowledge of weather forecast broadcast by meteorological office for navigation. Coding and decoding of forecasts by the use of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> chapter of code-decode book. Knowledge about the structure of the weather reporting system, viz, selected ship, weather ship, ship station.

#### Subject-6: **Applied Science**

There shall be question on theoretical and practical application of equipment systems used in ship which may also involve mathematical solution; questions may be set in such a way that candidates can demonstrate their knowledge of theories of physics.

Demonstration of acquired knowledge and practical application are expected from the candidates than memorised description or theories.

- (a) (i) Measurement of Heat; Thermometers; Thermocouples; Transmission of Heat; Conduction; Convection, Radiation.
  - (ii) Properties of gas; Boyle's law, Charles law, Isothermal and Adiabatic Expansion and Compression of gases, Principle's of refrigeration.
- (b) (i) Laws of Reflection; Plane mirror; Rotating mirror, Spherical mirror.
  - (ii) Laws of refraction; Index refractive; total internal reflection, prism, narrow lens; Formation of images by lens.
- (c) (i) Wave motion, frequency, wavelength and their relationship. Production and propagation of sound.
  - (ii) Effect and air pressure on speed of sound.
  - (iii) Reflection, echoes and Doppler Effect.
- (d) (i) Theory of magnetism. Laws of magnetism. Intensity of magnetism, permeability, retentivity, Ferro-magnetic material, Hysteresis curves.
  - (ii) Pole strength, field strength, magnetic moment and couple, deflection of a magnetised needle.
  - (iii) Magnetism of the Earth and magnetic element, variation.
- (e) (i) Nature of electric current; E.M.F. Current, Resistance, their effects and relationship, electric potential, insulator and insulation, Electrical and magnetic field related with electric potential and current, Capacitance.
  - (ii) Heating effect of electric current, power and electric current and its relation with resistance. Magnetic field caused by electric current and its resulting effects. Effect of electric current passing through a conductor into a magnetic field. Chemical effect, electric current through electro-conductive solution.
  - (iii) Primary and secondary cells and batteries.
  - (iv) A.C. voltage and current. Relation between frequency and phase. Peak instantaneous and R.M.S. values. Reactance, impedance and power dissipation, Resonance and rectification.

- (v) Simple A.C. and D.C. Circuits. Fuses and circuit breaker devices. Open circuit, short circuit and leakage. Effect of dust and humidity. Principles generators and motors. Effect of general knowledge of ships power. Emergency sources. Necessary precautions in use of electrical equipments on board ship and spare parts.
- (f) Concept on electro magnetic radiation and the need for a carrier wave of high frequency. Relations of Propagation, Polarisation and wavelength/frequency. Ground and sky waves. Functions of marine communication, Transmitter and Receiver.
- (g) (i) Corrosion, reaction between dissimilar metals.  
(ii) Combustion, spontaneous and induced. Flash point and ignition temperature. Explosive mixtures, Chemical transformation due to high temperature.  
(iii) Fire extinguishing, powder, foam, inert gases.

#### Subject- 7: **Principles of navigation**

- (a) The shape of the Earth. Poles, equator, longitude, latitude, fixing position through latitude and longitude. Directions, bearing, distance, units of measurement. Difference of latitude, difference of longitude, departure, mean latitude, difference of meridional parts and their relations. Great circles, great circles track and distance, small circle.
- (b) Celestial sphere, definitions of celestial spheres, apparent motion on celestial sphere. Declination, Azimuth, Sidereal hour angle. The position of a body in the celestial sphere, altitude with azimuth or sidereal hour angle with declination. Rising and setting of heavenly bodies.
- (c) Solar system, earth and moon, motion of planets. Rotation and motion of earth in the orbit, mean sun ecliptic, first point of Aires, equinox and solstice, sunrise, sunset, twilight.
- (d) Time, Greenwich and other standard time. Zone time, mean time, apparent time, sidereal time, equation of time, relationship between longitude and time.
- (e) Local hour angle of a heavenly body in time & arc. Greenwich hour angle of sun, moon, planets and Aires.
- (f) Correction of sextant altitude. Dip, refraction, horizontal parallax, parallax in altitude; semi-diameter and its augmentation.
- (g) Geographic position of heavenly body. A position circle and its practical application, position line, intercept.
- (h) Common features of Mercator and gnomonic chart, scale of latitude and longitude, measurement of distance. Rhumb line. Great Circle and composite great circle track.
- (i) Phases of the moon and its relation with tide.
- (j) Principles of position fixing by measuring distance from two or more fixed. Hyperbolic lattice on navigational chart. Modern navigation systems, e.g., theoretical knowledge of G.P.S.

#### Subject 8: **Mathematics**

- (a) Definitions and Methods. Theory of indices. Simple Equations, Problems regarding simple equations. Developments of Formula. Transposition and evaluation. Fraction. Factors, simultaneous equations of the first order involving two or more unknown numbers.

Problems relating to simultaneous equation. Solution to quadratic equation. Problems relating to quadratic equation. Graph. Reference axes. Rectangular and polar co-ordinates. Drawing and reading of statistical graph and diagram. Graph of function's, linear, Algebraic and trigonometric  $0^\circ - 360^\circ$ , gradient, rate of change, highest and lowest point. Proportion, Proportionate and variation; general problems.

- (b) Use of logarithm of any base. Calculation of Multiplication and division by logarithm. Powers and roots. Exponential equation.
- (c) Demarcation of area of rectangle, triangle and circle. Volume and surface area of wedge, cylinder, sphere rectangular block and problems thereon.
- (d) The construction of plain triangle. Congruence of triangles. Similarity of triangles right angled triangle. Angular addition of polygon and triangles. Properties of outer angle. Parallel line and transversal. Properties of circle, chord and tangent. Angle in a semi-circle angles subtended by a chord in a circle. Force, resultant forces and their components. The use of vectors in determining amplitude and direction. Vector addition, use of the vector triangle properties of the ellipse and hyperbola a used in navigation.
- (e) Measurement of angle. Circular measurement, Trigonometric ratios up to one revolution. Haversine, relationship between ratios Complementary and supplementary angles and their ratios. Simple identities and trigonometric equations. Solutions to problems of right angled and oblique plane triangles.
- (f) Properties of spherical triangles, solution to oblique, right angled and quadrantal spherical triangles.
- (g) Composition and resolution of force. Theory of moments. Stress, strain, bending moment and shearing force of simply supported beams with and without load. Simple machines, lever, screw jack pulley systems, mechanical advantage, velocity ratio, efficiency. Pressure in liquid substance pressure at a depth, pressure and thrust.
- (h) Composition and resolution of velocity and acceleration. Newton's Law, motion under gravity, work, power, kinetic and potential energy, momentum, friction, co-efficient of friction including simple mathematical problem.

**B. Signalling Examination:**

Sending and receiving Signals:

- (a) Morse code by flash lamp- up to six words per minute.
- (b) International code of signals.

**C. Oral Examination:**

Candidates shall be well conversant with following topics:-

1. Navigation

(1) Safe Navigation

- (a) Proper knowledge about sea watch keeping principle at sea including port, anchorage and pilotage operation.
- (b) Complete knowledge about international regulation for preventing collisions at sea and purpose and application of annexes regarding safe navigation in fog, at night and

daytime (Candidates shall not be asked to navigate sailing ship or boat, but shall have proper knowledge about light shown by those ships and navigation according to direction of wind.)

- (c) IALA Buoy system.
  - (d) Navigational Chart and publication, sailing direction, tide table, Notice to Mariners, Radio navigational warning, Routing information.
  - (e) Knowledge about eco-sounder and bridge equipment.
  - (f) Use, care and limitations of Magnetic and Gyro Compass with Autopilot.
  - (g) Operation of Automatic Steering Control System and knowledge of change over from manual to automatic and automatic to manual.
  - (h) Determination and use of azimuth and compass error use of pelorus and bearing plate and other bearing measurement equipments.
  - (i) Use of sextant in measurement of horizontal and vertical angles. Determining reading of sextant on the arc and off the arc. Determination of index error of sextant.
  - (j) Correction of sextant with error of perpendicular its, side error and index error.
  - (k) Reading of Barometer and Thermometer.
  - (l) Comparison, maintenance, winding and rating of Chronometer.
  - (m) Proper knowledge about use of distress signal and penalty misuse.
  - (n) Emergency communication system under G.M.D.S.S. regulation.
- (2) Response during emergency:-
- (a) Initial action following collision, grounding, flooding or major mechanical damage. Control and assessment of initial damages. Preservation of marine environment.
  - (b) Man overboard.
  - (c) Assistance to ship in distress, responding during emergency at port.
  - (d) Precaution for safety and safeguarding of passengers during emergency.
  - (e) Emergency and IAMSAR manual, distress signals, international code of signals. Standard Marine Navigational vocabulary of International Maritime Organization.
- (3) Ship Manoeuvre:
- (a) Preparation for arrival and departure of ship ; preparations before departure, berthing at port, entry into dock, berthing at jetty or alongside other vessels, making fast with buoy.
  - (b) Helm orders, effect of propeller on steering of ship, stopping, going astern, interaction with other ships and squat. Manoeuvring in the vicinity of other ships and pilot boats. Embarkation and disembarkation of pilots, turning short round. Anchoring during emergency.
  - (c) Faults of Bridge equipments. Failure of bridge control or telegraph. Emergency steering.

2. Cargo handling and stowage:

(1) Supervision of cargo loading and discharging

- (a) Use and maintenance of wire rope and synthetic fibre, determination of safe working load.

- (b) Knowledge about regulations recommendation and regarding cargo handling stowage, securing maintenance and. Knowledge on IMDG code and its use.
- (c) Use of Hydrometer, Hygrometer and other related apparatus.
- (d) Precautions taken before entering to void space, ballast tank and cargo space.
- (2) Supervision of Cargo Stowage Securing and maintenance
  - (a) Knowledge about IMO code of safe practice for cargo stowage and securing.
- 3. Shipboard Operation:
  - (1) Compliance for prevention of pollution
    - (a) Precautions taken for prevention of pollution of marine environment as requirements of MARPOL Convention, Disposal of polluting substance.
    - (b) Basic knowledge on anti pollution equipments and COPEP manual.
  - (2) Maintaining seaworthiness.
    - (a) Name of major parts of structure of vessel and actual name of various parts.
  - (3) Control and Response of Fire extinguishing on board ship
    - (a) Fire extinguishing: Use and maintenance of various equipments for fire extinguishing. Breathing apparatus and emergency escape. Response and duties at fire mishap caused by inflammable oil substance: Organise emergency team and drill.
  - (4) Operating Life saving appliances
    - (a) Use and maintenance of life saving appliances including EPIRBs, SARTs Portable Radio, immersion suit and thermal protective aids; use and maintenance of line throwing apparatus.
    - (b) Launching and recovery of lifeboat.
    - (c) Basic principles of surviving at sea.
    - (d) Search and rescue worldwide, especially in the Bay of Bengal.
    - (e) Knowledge about training manual.
    - (f) Meaning of marks used in lifeboat and related apparatus.
  - (5) Knowledge about legislative requirements
    - (a) Knowledge about Code of Safe Working Practice for safety of Merchant seaman, Admiralty notices to Mariners.
    - (b) Knowledge about Bangladesh Merchant Shipping Ordinance, 1983.
    - (c) Application and objectives of I.S.M. Code.
    - (d) Port State Control.
  - (6) Knowledge about leadership, team working and management skill.

**Deck Officer Class-1 and Class-2**

**A. Written Examination (for Deck Officer Class-2)**

**Subject: 1 Navigational Aids**

- (a) Use and understanding of navigational aids including radio and electronic navigational equipments widely used on board Bangladesh Ocean going vessels. Proper knowledge about principles, operation, use, capabilities and limitations of those navigational aids.
- (b) Interpretation and use of navigational and weather information.
- (c) Interpretation and use of information received from navigational aids; use of radar to avoid collision.
- (d) Position fixing: Effects of systematic and random errors received in any method.
- (e) Advantages and disadvantages of various methods of navigation system; choice navigational systems for different trades and geographical regions.
- (f) Magnetic compass, its use, construction, care and maintenance. Causes of deviation, making deviation table. Coefficients A, B, C, D and E. Finding the value of co-efficients from given data and their relation with deviation. An appreciation of the separate effects of “hard” and “soft” iron. Basic principles of compass adjustment and related methods. Heeling error. Gaussing error and retentive error.
- (g) Basic theory of gyro compass; errors of gyro compass. Latitude, course, speed, errors, ballastic deflection and their corrections; Ballastic deflection and its relation with speed error; major parts of gyro compass, basic difference of usage and construction of widely used gyro compass.
- (h) Basic principle of operation and usage of gyro compass, Transmitting magnetic compass, Autopilot, projector compass, rate of turn indicators.
- (i) Basic principles and application of Echo sounding devices, logs, speed indicators.
- (j) Full idea about recent development of navigation and navigational aids.

**Subject-2: Meteorology**

- (a) Air masses ; general idea about classification of its regions and physical properties. Formation of depression; general arrangement of winds around low pressure, trough of low pressure, anti cyclone, secondary depressions; family of depression, Jet flow and adiabatic formation of frontal depressions.
- (b) Change of air temperature, dry and saturated lapse rate. Stability, instability, and conditional instability. Forecast about probable direction and Measures to be taken to avoid T.R.S.
- (c) A full knowledge of the development and decay of tropical cyclones; its regions, names, seasons and related weather; Forecast about probable change in sea state. Weather map received from facsimile and its usage. Determining weather in the course of a voyage.
- (d) Knowledge about weather information required for voyage. Use of synoptic and prognostic charts and forecasts for weather in specific sea areas and forecast about probable change of weather. Facsimile weather charts and their usage. Determining weather in the course of a voyage.
- (e) Major ocean currents: their names and characteristics. Causes of ocean current, general circulation of surface ocean current, direct and indirect effect of prevailing wind, predominant current, seasonal change in general circulation of surface ocean current,

(f) Availability of sea wave information and usage.

**Subject - 3: Engineering and control System**

- (a) (i) Knowledge about meaning of commonly used engineering terms.
- (ii) General knowledge about diesel and turbine equipments, marine boiler, generator, pump, condenser. Transmission of Main engine power, steering system, ship operating process.
- (iii) Relation between fuel consumption and economic speed, energy, speed, efficiency and fuel consumption. Problems about pitch and ship's speed.
- (b) Understanding application of physical characteristic of gases to the ships. Methods of transporting frozen cargo and liquefied gas.
- (c) General theory of automatic control system. Classification of controllers; Practical methods of air, electric and hydraulic controllers; pump and valve. Informatics and display; data logging, stress indicators control of main engine from bridge room; other aids in ship manoeuvring that are not mentioned stabiliser.
- (d) Fire detection and fire fighting methods; general principle and practical application. Effectiveness and limitations of various fire extinguishing methods.
- (e) Pollution: Anti-pollution equipments.
- (f) Proper knowledge about integrated bridge system.

**Subject-4: Shipboard Operations**

- (a) Organizational training of seafarer in both routine and emergency duties and determining factors. Making up losses and fire extinguishing plan; Response plan for oil pollution, Emergency station list.
- (b) Maintenance and inspection of ship and related materials, general repairs, preparing repair list, dry docking work list. Physical characteristics and usage of paints and other protective coatings.
- (c) General principles of shipment of all kinds of cargo, transportation and movement; precautionary measures in their transportation, shipment of both dry and liquid cargo, use of related calculations and cargo gear. MARPOL and IMDG code.
- (d) Cleansing and gas freeing of ballast tank, bilge and ballast line system. Piping system for tankers carrying liquid cargo.
- (e) Knowledge about rules and recommendation of shipping, transportation and movement of cargo in the ship. General knowledge about International Codes of Practices. I.S.M. Code.
- (f) Knowledge about load-line rules influencing the operation area of the ship. Their significance in various zones and seasons. Survey preparation.
- (g) Preparation of safety equipments, related arrangement and classification survey. Knowledge about the significance of certificates issued.
- (h) Tonnage certificate and its application. I.T.C. Tonnage measurement and its practical application.

**Subject -5: SHIP CONSTRUCTION**

- (a) Classification of ships. Knowledge of power and construction in case of specific trades and specialised carriers. Use of specialised steel, aluminium and fire retardant materials.
- (b) Midship section of single deck and double deck of general ship, bulk carrier, containerised vessel, specialised vessels, etc. uses, construction and strengthening of collision bulkhead and water resistant bulk head. Construction and strengthening of stern structure; construction and strengthening of hull and hatchway closing devices of ship; Water tightness of ship and doors of ships structure.
- (c) General knowledge about welding used in shipbuilding and repairs. Types of welding, general defects, external Examination of welding. Inspection of tanks and other water tight compartments. Continuous corrosion control methods.
- (d) Determination of general load curve in combination of shearing forces and bending moment. Torsional stresses. Modern technique of determining effect of various conditions caused by loading and ballasting on the structure of ship. Compensation methods due to local and special strength discontinuity.
- (e) Classification of ships; Periodic survey of maintaining classes. Rules of cargo ships construction and survey and necessary surveys under the rules.
- (f) Knowledge of problems and damages of various parts of cargo space, hatch cover and ballast tanks of bulk carrier and other ships and their proper remedies.

**Subject -6: BUSINESS AND LAW**

- (a) Major international organizations and conventions relating to shipping; [e.g., IMO, ILO, SOLAS, MARPOL, STCW, etc.]
- (b) Registration of Bangladeshi vessels, Bangladesh Registration Certificate and its legal implication.
- (c) Mandatory Certificates, documents and publications to be on-board ship; use, availability and validity of those documents.
- (d) Custom House procedure, submission of statement and outward clearance of ship. Functions of ship agents.
- (e) Functions of national administration and private organisations on maritime matters.
- (f) Recruitment of seamen, discharge, management, crew list and necessary certificates. Contract of agreement, salary and other allowances, allotments. Immediate measures to be taken in case of deceased seamen, replacement appointment, compensation, distressed Bangladeshi seamen.
- (g) Official log book and laws of related subject. Various types of offences, e.g., misconduct, person hazardous for ship and seamen. Discipline; Punishment against disciplinary offence. Social obligation in some offences.
- (h) Safety of ship, seamen and passengers. Assistance to distressed ship; Measures to be taken during grounding, collision or other sudden accidents. Towing and rescue operation.
- (i) Laws concerning ship operation, prevention of collision, reporting of navigational hazards and marine accidents. Compulsory and optional piloting.



- (j) General knowledge of contract documents and shipping business Charter Parties, Bill of Lading, Sea-way bill, etc. Laws relating to cargo shipment along with contract of affreightment, despatch and demurrage (calculation), duties and responsibilities of ship-owners. Survey of cargo.
- (k) General knowledge about “Expressed Warranty Conditions” and “Implied Warranty Conditions and statutory terms, which relate to Marine Insurance Policy. Knowledge on “Particular average”, “General Average”. Procedure for Port of Refuse, Lloyds Representative and Institute of London Under-writer.
- (l) Pollution: Measures to be taken by Master, obligations responsibilities and record keeping.
- (m) Vessel classification, class survey, classification certificate and interim certificate, consequence of non-classification. Sea-worthiness certificate.
- (n) Port Estate Control.
- (o) Piracy and armed robbery.

**Subject-7: SHIP STABILITY**

- (a) Determining centre of gravity of ship in various condition of cargo loading and ballasting. Effect of loading, discharge, movement and hanging weight on centre of gravity of vessel. Determining virtual effect of centre of gravity of vessel caused by partially filled tank. Horizontal and vertical metacentre, metacentric height. Initial stability and limitation of small angle of inclination. Change of stability during voyage. Effect of movement cargo or solid ballast. Stiff and tender vessel.
- (b) Change of draught and trim caused by loading, discharge and movement of cargo. Effect of list and trim on ship stability. Stability and trim during dry docking.
- (c) Stability at large and medium angle of heel. Determining dynamical stability from GZ line. Angle of loll. Cargo loading and movement with zero GM; effect of wind and wave.
- (d) Hazards of ship in angle of loll. Precaution in up righting ship. Deck cargo, homogenous cargo and movable cargo. Ballasting for stability. Effect of breath and freeboard on stability.
- (e) A full knowledge about inclining experiment, hydrostatic particular of vessel, stability and stresses.
- (f) Knowledge about factors changing the size of statically curve line and effect of area under the curve and its determination. Use of simplified stability information. Moment of grain movement.
- (g) Prevention policy of damages and losses of ro-ro vessel and passenger ship. Measures for prevention of fire spread on superstructure.
- (h) Conditions of load line rules, term and conditions of validity of certificate; knowledge about influencing factors of seaworthiness and stability. Knowledge about formulae of determining subdivision load line in passenger ship.
- (i) Permeability of a compartment. Effect of bilging and flooding (in the middle or front or rear, centre line or by the side).
- (j) Effect of shallow water; Interaction between ships and interaction between ship and shore. Turning circle. Heel during turning; effect on stability.
- (k) Load line mark and area. Calculation of their usage.

**Subject -8: NAVIGATION**

[Candidates shall have to demonstrate a full knowledge about techniques pertaining to navigation and use of weather forecast information]

- (a) (i) Determining latitude with the help of meridian altitude of celestial body, determining latitude with the help of observation of the Polar Star.
- (ii) Determining position line and a position through which it passes from observation of any other celestial body except moon locating in or near the meridian.
- (iii) Determining position using two or more position lines (with or without run).
- (iv) Determining error of magnetic compass and deviation with the help of true bearing of celestial body for specific course of ship.
- (b) (i) Voyage planning and monitoring. Selection of sea route. Shore based weather routing and own routing. Use of prognostic surface weather and wave chart. Use of navigational publication and navigational chart.
- (ii) Voyage planning in coastal route and its monitoring. Arrival at coast. Arrival at and entry to port. Calculation of tides.
- (iii) Navigation at the area of piloting with or without pilot.
- (iv) Traffic separation scheme and arrival and departure to adjacent area.
- (v) Explanation of radar plot.
- (c) (i) Determining course and speed for arrival of two vessels at one point for any purpose.
- (ii) Search and rescue and reporting system. IAMSAR Manual.
- (iii) Navigation in the vicinity of ice. Necessity of reporting as per international convention.
- (d) Arrangement of bridge team at sea, port and arrival and at anchorage.

**B. Signalling Examination (for Deck Officer Class-2):**

To send and receive signal:

- (a) Morse code by flash lamp- six words per minutes.
- (b) International code of signal.

**C. Oral Examination (for Deck Officer Class-2):**

In addition to the syllabus for Deck Officer Class-3, shall have to be well conversant with following topics:-

1. NAVIGATION

(1) Safe Navigation

- (a) Magnetic Compass- Variation and Deviation, causes and effect: how to use: sitting magnetic compass and reference of magnetic effect.

- (b) Effect of wind and current: Effect of deadweight, draught, trim, speed, under keel clearance, turning circle and stopping distance, reaction with squat and interaction with other ship.
  - (c) Taking necessary steps while navigating through ice and steps to be taken during freezing.
  - (d) Port radio service: knowledge about all services for ships available at port, knowledge about berthing, NTIS, VTIS, Admiralty list of Radio signal and port operation.
  - (e) Status of Admiralty RASTER Navigational Chart System.
  - (f) Ability to interpret of synthetic chart and weather forecast.
- (2) Response during emergencies:-
- (a) Initial action following collision, grounding, and flooding or major mechanical damage. Control and assessment of initial damages control. Preservation of marine environment.
  - (b) Actions when in danger and disabled, abandoning ship and means of survival.
  - (c) Towage of own ship by other and towage of other ship.
  - (d) Protecting seamen and passengers during sinking of ship.
  - (e) Beaching of ship.
  - (f) A full knowledge about search and rescue operation as stated in IAMSAR Manual.
  - (g) Assisting ships and aircraft during distress.
  - (h) Rescue of passenger and crew from damaged ship and ditched aircraft.
  - (i) Safety in helicopter operation.
- (3) Ship Manoeuvring:
- (a) Manoeuvring of ship in restricted area and open sea.
  - (b) Ship berthing and un-berthing with tug and without tug, with current and without current jetty, mooring buoy and single point.
  - (c) Knowledge about manoeuvring characteristics of ships without main propulsion power and steering gear twin screw ship, manoeuvring of ships with thrust and azimuth unit and manoeuvring of conventional ships.
  - (d) Ship management in heavy weather.
  - (e) Application of constant rate of turn system.

## 2. Cargo Handling and Stowage

- (1) Supervision of cargo loading and discharge:
- (a) Maintenance and use of all kinds of Deck machinery and cargo handling equipment.
  - (b) Precaution during loading and discharge of deck cargo, timber, hazardous cargo, container, grain, refrigerated cargo, dry bulk cargo, liquid cargo, metal ore cargo and heavy lift using vessel or port equipments.
  - (c) Use of Hydrometer and Hygrometer and other equipments.
  - (d) General knowledge about oil tanker and operation.
- (2) Supervision of cargo stowage, securing and maintenance.

- (a) Knowledge of code of safe practice on cargo stowage and securing of international maritime organizations.
  - (b) Knowledge and application of International Maritime Dangerous Goods code (IMDG code) and IMO code of safe practice for solid bulk cargo.
  - (c) Care and maintenance of cargo at sea and related precautions.
3. Onboard ship operation
- (1) Compliance for prevention from pollution
    - (a) Action for prevention of pollution in port and at sea.
    - (b) Response to pollution on board ship and in port and taking proper steps.
    - (c) Basic knowledge on Pollution prevention equipments and SOPEP manual.
    - (d) A full knowledge about MARPOL convention.
    - (e) Knowledge about duties actions and responsibilities pertaining to pollution.
  - (2) Maintaining seaworthiness:
    - (a) Necessary measures for prevention of water ingress into vessel during heavy weather.
    - (b) Function of load line items affecting seaworthiness.
    - (c) Necessary measures for structural damage due to cargo movement fall of cargo from top or water ingress into the structure.
    - (d) Preparation of dry docking with as without cargo. Use of bilge blocks, bilge shores etc. general procedures and precautionary measures.
    - (e) Use and maintenance of all equipments on the deck including winches, capstan, windlasses, davit, fairlead, anchor and fitting used in chain locker.
    - (f) Anchor: Various types of anchors and their advantages and disadvantages: Preparation for anchoring: Anchoring by a single anchor and use of second anchor: Clearing foul anchor and foul house: Anchoring in restricted area and current : Hanging anchor: Breaking and peeping chain: Departure of ship from anchorage.
  - (3) Fire extinguishing, Control and prevention of fire on vessel
    - (a) Knowledge about rules and regulation regarding fire extinguishing appliances.
    - (b) Fire extinguishing methods on ship: Fire extinguishing at sea and in port.
    - (c) Action for preventing the spread of fire.
    - (d) Inquiry and management of fire on board.
  - (4) Operating life saving appliances
    - (a) Knowledge about rules and regulations regarding life saving appliances.
    - (b) Launching of survival craft and management: Recovery of boat from sea: Beaching and landing of survival craft: Ensuring survival on life boat and survival craft and boat.
    - (c) Management of lifeboat, life raft and MES team.
    - (d) Complete knowledge about training manual.
  - (5) Legislative knowledge
    - (a) Application of safety regulation and pilot ladder rule and related complete knowledge.
    - (b) Routine inspection of living quarter and store rooms: method of complaints.

- (c) Knowledge about load line mark; freeboard, report about draught and allowance and writing log book.
  - (d) Responsibilities regarding pilot.
  - (e) Towage and salvage agreement.
  - (f) Legal obligation of keeping oil record books and other records.
  - (g) Legal obligation of drill and training.
  - (h) Relation between IMS code and national laws.
  - (i) Requirements of statutory and classification survey: extension of certificates.
  - (j) Commercially required certificates relating to cargo and cargo system.
  - (k) Port state control.
  - (l) Laws pertaining to navigational hazards of, reporting requirements.
- (6) Knowledge about Leadership, team work and management skill

**D. Oral Examination (for Deck Officer Class-1):**

In addition to the syllabus for oral Examination of Deck Officer Class-2 and Deck Officer Class-3, shall have to be well conversant with following topics:-

1. NAVIGATION:

(1) Safe navigation

- (a) Candidates shall be asked questions about compensation and adjustment of Magnetic Compass- use of magnetic compass, binnacle and compass, practical adjustment.
- (b) Knowledge about effective bridge team work. Knowledge about various types of weather including TRS and storm centre and avoiding dangerous quadrant.

(2) Responding to emergency

- (a) Measures to be taken when in danger and disabled, abandoning distressed ship and means of survival.
- (b) Measures to be taken in exceptional situation: missing rudder or propeller: precaution during beaching: survey on grounding and re-floating.
- (c) Assessment of damage control.
- (d) Towing at emergency and towage procedure.
- (e) Planning, implementation and coordination of SAR operations including establishing and maintenance of effective communication.

(3) Ship manoeuvre:

- (a) Managing and navigating ship in heavy weather: saving disable ship from sea wave & swell, reduction of drift and use of oil.
- (b) Precaution for manoeuvring rescue boat and survival craft in heavy weather.
- (c) Work with anchor and chain in all conditions.

- (d) Taking practical steps during freezing and navigation near ice.
- 2. Onboard ship operation:
  - (1) Compliance for prevention from pollution.
    - (a) Duties and responsibilities of Master including keeping records.
  - (2) Maintaining seaworthiness:
    - (a) Effect of inclement weather on the structure of vessel.
    - (b) Effect of rolling, pitching and list on ship stability: precautions during excessive list and uprighting.
    - (c) Impact of class of vessel and mode of trade on stability and stress of vessel.
    - (d) Pest control at ship: Fumigation of cargo hold and accommodation: precaution of adopting various methods.
  - (3) Engineering knowledge
    - (a) General knowledge of Marine Engineering terms.
    - (b) Remote control operation of Marine Power Plant and auxiliary machinery.
  - (4) Musters and drills
    - (a) Organising muster and drills on board ship.
  - (5) Legislative Knowledge
    - (a) Application of safety regulation and pilot ladder rule and related complete knowledge.
    - (b) Official log book and rules of its entry.
    - (c) Knowledge about load line mark and its entry and report of freeboard draught and allowance.
    - (d) Knowledge about Master's responsibility concerning marine insurance and cargo carriage contract: Cargo survey and protests: sea-worthiness certificate.
    - (e) Methods of port of refuge.
    - (f) Arriving at port in the damaged condition of cargo and vessel, commercial and technical aspects: safety of cargo.
    - (g) Requirements of International Health Regulation and Maritime Health Declaration.
  - (6) Knowledge about Leadership, team work and management skill.

### **Marine Engineer Officer Class-5 Examination**

#### **A. Written Examination:**

Subject:-1: **NAVAL ARCHITECTURE**

- a) General: Displacement, wetted surface area, block coefficient, mid section, Prismatic and water plain area, Ton per centimetre immersion. Application of Simpson rules regarding dimension, area and moment of area.
- b) Draught and buoyancy: Change in average due to change in water density. Buoyancy and reserve buoyancy. Effect of bilging Midship compartments.

- c) Transverse Stability- Centre of gravity, buoyancy centre, meta centre, change in centre of gravity due to addition or subtraction of mass, stability at small angles of heel, Inclining Experiment.
- d) Ship Construction- General definitions used in measurement of steel made ship, e.g., Length between perpendiculars, Moulded Breadth, Moulded Depth, Draught and free board. Definitions of ship building terms commonly used. Water tight door and hatches.
- (e) Tank and others—Fore and Aft Peak Tanks, double bottom and deep tank filling and pumping arrangements.
- (f) Load line- Primary knowledge of load line.

Subject:-2: **MACHINE DRAWING**

Drawing questions will be set on the basis of justifying worth of using projection's formula. Candidate shall be asked for drawing a marine machinery plan, elevation and section or all these views. All necessary information will be furnished in questions for completing drawing.

Following terms are worthy to be followed for drawing guidelines:-

1. Air inlet valve
2. Automatic valve.
3. Bilge Suction Strainer
4. Compressor Piston and Suction Valve
5. Control Valve
6. Cylinder Relief Valve
7. Feed check valve
8. Flow Regulator
9. Fuel Valve
10. Fuel Control Valve
11. Gear Pump
12. Hydraulic Steering Gear
13. Oil Strainer
14. Piston 4 stroke
15. Piston Upper and Rod
16. Quick Closing Valve
17. Reducing Valve
18. Rudder Carrier Bearing
19. Starting Air Valve
20. Starting Air Pilot Valve
21. Universal Coupling

**Subject-3: Coastal Vessel Engineering Knowledge (general)**

1. Ability of providing information about spare parts of machinery by general drawings, helping notes, specification and dimension.
2. Manufacturing method of various tools and physical features of elements commonly used.
3. Basic knowledge about formation of steering system.
4. a) Working principles of pump.  
b) General requirements for pumping system.
5. Working principles and constructional details of oily water separator.
6. a) Maintenance and operation of fire extinguishing equipments.  
b) Detection and prevention of fire.
7. Refrigeration: Principles of refrigeration, use and properties of refrigerants.
8. Basic knowledge of boilers.

**Subject-4: Coastal Vessel Engineering Knowledge (Motor)**

1. Working principles of marine diesel engine, gear, clutch and ancillary machinery.
2. Concept about fuel, lubricating oil, cooling system of diesel engine, filter, pump, heat exchanger and control system.
3. Manoeuvring methods, bridge control, variable pitch propeller.
4. Emergency controls.
5. Working principles of Air compressor, air receiver and related equipments.
6. Operation and Examination of general automatic control system and alarm panel.
7. General concept of fuel injection, fuel pump, injector.
8. Scavenging and super charging; scavenging functions of two stroke and four stroke engines, general theories of exhaust system and turbo charger.
9. Hazards of engine operation, Crankcase Explosion.
11. Maintenance, safe and effective operation of marine diesel engine.

**B. Oral Examination:**

1. Routine regarding takeover and handover Engineering Watch.
2. Realisation of significance of writing engineering room log book and recorded matters.
3. Performing routine works at engineering watch.
4. Routine relating to handover of duty to next engineering watch keeper.
5. Taking safety precaution during engineering watch keeping.
6. Immediate action for fire or other accidents.
7. Preparation of main engine, auxiliary engine and machinery for voyage.
8. Routine Pumping operation for fuel oil, fresh water.



9. Routine operation of bilge, ballast and sanitary system.
10. Use of oily water separator to prevent environmental pollution.
11. General idea about boiler operation.
12. Identification of general faults of electric circuit. Immediate steps for electric accident and personal safety.
13. Identification and rectification of defect of pump and pumping system.
14. Identification and rectification of defect of machinery and plant in engine room.
15. Primary concept of dry docking and safety survey.

### **Marine Engineer Officer Class-4 Examination**

#### **A. Oral Examination:**

1. Identification and eliminating defects of machinery and plant of engine room.
2. Care and maintenance: a) Steering system, b) Pumping system, c) Oily Water separator.
3. Concept about use of air compressor and basic theory.
4. Starting, maintenance and changing of generator.
5. Handling and maintenance of fire extinguishing aids; detection and prevention of fire.
6. Operating and maintenance of Refrigeration Plant; detection of gas leakage and removing defect; refrigerants and their principles.
7. General rules of operating and functioning of marine diesel engine, gear system, clutch and ancillary tools.
8. Procedure of starting and reversing system.
9. Knowledge about fuel oil system, lubricating system, cooling system of marine diesel engine.
10. Safe and efficient operating and maintenance of diesel engine.
11. Administrative duties of Chief Engineer:-
  - (a) Organisation and training for staff of ship during normal and emergency situation.
  - (b) Ensuring seaworthiness of ship on the prior sailing in various types of voyages.
  - (c) Legal power and responsibility.
12. Knowledge of dry docking and safety survey.
13. Proper concept about Bangladesh shipping laws, coastal vessel laws, etc.

### **Marine Engineer Officer Class-3**

#### **A. Written Examination:**

Subject: 1 **APPLIED MECHANICS**

**Statics:** force as vector, triangle and polygon of force, equilibrant and equilibrium, moment of force, moment of area and dimension, centroid and gravitational centres (limited in geometric form), Elasticity of solid matter, measurement of force required for pulling, lifting or retaining stably upward or downward an object located under a bend (with result of friction).

**Friction:** Co-efficient, consumption of power and energy by friction in general bearing, linear speed, graph and equation for motion, speed, velocity and uniform acceleration, velocity as vector, relative velocity on the same level, angular speed, equation for movement, velocity and uniform acceleration.

**Dynamics:-** work and power, problems of constant force or linear change of force, energy, Newton's laws, preservation of load-velocity, load centric force and its use in angular pendulum, unloaded governor, stress on bent passage and thin rim of machinery due to load/pressure centric force.

**Machine or Tools:** General tools used for lifting, load effort and load efficiency, linear formula, velocity ratio, mechanical advantage and mechanical advantage of the following tools and efficiency: Excel wheel, Differential wheel and excel, Pulley block of rope, differential pulley block, screw jack ware, week screw, hydraulic jack, chain block run by worm and single and double purchase grab winches, reduction systems.

**Hydrostatics:** Elasticity of floating objects, variation of pressure of fluid with depth, total force on submerged, vertical or horizontal surface for pressure of liquid matter. One of pressure points, on the top of square vertical surface or triangular surface, shall be parallel with upper surface of side liquid substance.

**Hydraulics:** Full bore flow of liquid substance through pipe in similar head, flow by orifices, co-efficient of velocity, contraction and outflow of area.

## Subject: 2 **Applied Heat**

Temperature and its measurement; absolute temperature, specific heat capacity, specific enthalpy of vaporisation and refrigeration.

Boil for real gas and Charles's theory, equation, constant 'R' and its application in mathematical problem, Isothermal, adiabatic and polytrophic process, relation of pressure, temperature and dimension, change of internal energy, relative temperature and constant dimension and their co-relation.

Combustion, solid and liquid fuel, calorific value, chemical equation for perfect combustion, theoretical necessity of lowest wind blow, strong wind.

Refrigeration: Compression cycle of vapour, refrigerating effect, use of table of cooling load refrigerant, co-efficient of effectiveness.

## Subject:3 **Electro-Technology**

Electric circuit, units- ampere, ohm, volt, distinction between electric power and potential difference. Ohm's theory, Karshof's theory, E.M.F. related general serial /sequential and parallel circuit, electricity and resistance, resistant of specific value, non-linear resistance in parallel condition, power and force, co-efficient of temperature, conductor resistance and effect of length, area, factors and temperature, D.C.-2 wire rotation, electrolytic activities and electrolytic partition theory use for melting of secondary cell, use of electrolysis, formation and

features of secondary cell (acid and alkaline), maintenance and charging, efficiency of watt-hour and ampere hour.

Electro-magnetism, inductance of electro-magnet, general magnetism theory, magnetic field and force line, force of magnetic field, density of surface, magnetic field for current flow in straight conductor, loop, coil and solenoid, relative velocity of magnetic field, Theory of Lens and Ferrad, values of inductive E.M.F. and course, effect of outer surface of iron, magnetomotive force permeability, reluctance, general electric circuit, Typical B/H and M/H curves, relation of reactance, impedance, general effect of power factor and usage, unique phase in AC circuit.

Instrument: Equipment for measuring nature and quality of electric flow, use of relays, shunt and resistance in series, rectifiers and transducers.

#### Subject: 4 **NAVAL ARCHITECTURE**

General: Displacement, watered surface area, block coefficient, mid section, Prismatic and water plain area co-efficient, Ton per centimetre immersion, Application of Simpson rules regarding dimension, area and moment of area, Draught and buoyancy: Change in average due to change in water density. Buoyancy and reserve buoyancy. Effect of bilging of mid ship compartments. Transverse Stability- Centre of gravity, buoyancy centre, meta centre, change in centre of gravity due to addition or subtraction of gravity, stability at small angles of heel, Inclining test.

Ship Construction- General definitions used in measurement of steel made ship, e.g., Length between perpendiculars, Moulded Breadth, Moulded Depth, Draught and free board.

Definitions of shipbuilding terms commonly used. Water tight door and hatches. Description and illustration of structural chambers used in ship made of general steels, water resistant doors and hatch, ventilation of pump room of tanker, hold and fuel tank (manual or mechanical), Fore and aft peak tank, double bottom and filling deep tank and pumping.

#### Subject: 5 **MATHEMATICS**

- 1) Arithmetic: Ratio and proportion; percentage, variation, direct and inverse RATIO.
- 2) Algebra: Indices, Fractional and negative indices, Use of common Logarithms for multiplication, division, powers and roots, Use of Napierian Logarithms; Simplification of Algebraic expressions; Addition, Subtraction, Multiplication, Division of Algebraic function, Rearrangement of Formulae, Factorization, Algebraic fractions, Squares and Cubes of polynomials, such as  $(a \pm b)^2$  and  $(a \pm b)^3$  Simple equation, Quadratic equations and solution by factorisation, use of general formulae for solution, simultaneous equations.
- 3) Graphical work: The graph  $Y = ax + b$  either from calculated values or from experimental results; Calculation of constant graphs; Graphical solution of simple simultaneous equations involving two unknowns; Graph of  $Y = ax^2 + bx + c$ , Graphical solution of equation  $ax^2 + bx + C = 0$ .

#### Subject: 6 **ENGINEERING KNOWLEDGE (GENERAL)**

##### Section-A (Auxiliary Machinery)

1. General illustrations, efficiency of providing information about spare parts of machinery by helping notes, specification and dimension.

2. Manufacturing method of various tools and physical features of elements commonly used.
3. Structure of auxiliary boiler.
4. Construction and arrangement of steering system.
5. a) Construction and Working principles of pump.  
b) General requirements for pumping system.
6. Working principles and constructional details of oily water separator.
7. a) Construction, maintenance and operation of fire extinguishing appliances.  
b) Detection and prevention of fire.

#### SECTION-B: CONTROL ENGINEERING

1. **Instrumentation and Control of Terminology:** Controller, process, Measuring element, correcting element, Measured value, set value, deviation, offset, proportional band, gain, reset or integral action time, rate or derivative action time.
2. **Measuring Element:** Heat, pressure, flow, level and other measuring elements. Differential pressure cell.
3. **Control Theory:** Mode of Control- continuous, step by step; principal elements, correcting and measuring units, two-step control, proportional action, Integral action, proportional plus Integral (P +I), derivative action, (P+I=D), split range control, cascade control.
4. **Shipboard Control System:** Single Element Control for cooling Water, Split range cooling system for fuel Valve coolant, two element cascade control for system for piston cooling, Temperature control for lubricating oil, Control system for purification of boiler fuel oil, Fuel oil viscosity control, Refrigeration chamber Temperature control, interface level control of oily water separator.
5. **Control Air Supply:** Air system for control and Instruments, pressure regulating valve, air quality, means of drying.

#### Section-C: MARITIME LAWS & SHIP PERSONNEL MANAGEMENT

1. **Maritime Laws:** General knowledge about International Maritime Laws and National Marine and ship laws. Basic concept:- IMO, Marine administration-Flag state control and port state control. Classification Society and various kind of Survey, necessary certificates and documents that have to be kept on-board as per requirement of international conventions. Responsibilities and duties under conventions: SOLAS, MARPOL, STCW, LL, ILO, FAL, HIR. National maritime acts- BMSO, BMFO, ISO & DOS-notice.
2. **Safety of ship & security of crews:** Idea about compulsory safety equipments for the safety and security of vessel, fire organization, fire drill, ship abandon drill, maintenance of life saving appliances and fire extinguishing equipments.
3. **Emergency Control Plan :** Contingency plan to meet emergency, fire prevention in specialised places, rescue operation from confined place, damages in rough weather, rescue of life from other ship in rough weather, leakage or spillage on ship from hazardous cargo, stranding of ship, abandoning ship, emergency in port, flooding in different compartments.

4. Knowledge about leadership and management skill.

**Subject -7: Engineering Knowledge (Motor)**

1. Working principles and functions of marine diesel engine, gear, clutch and ancillary machinery.
2. Diesel Engine cooling, fuel, lubricating oil, and their systems, e.g., filter, pump, heat exchanger and control system.
3. (a) Manoeuvring methods, bridge control, variable pitch propeller.  
(b) Emergency controls.
4. Working principles of Air compressor, air receiver and related equipments.
5. Operation and Examination of general automatic control system and operating testing of alarm panel and rectifying faults.
6. Maintenance, safe and effective operation of marine diesel engine.

**B. Oral Examination:**

1. Routine regarding takeover and handover Engineering Watch.
2. Significance of taking watch reading and writing engineering room log book.
3. Performing routine works at watch.
4. Routine relating to handover of duty to next watch keeper.
5. Taking safety precaution during engineering watch keeping and Safety measures during watch and immediate action for fire or other accidents.
6. Preparation of main & auxiliary engine & testing for sea.
7. Routine pumping of fuel and soft water.
8. Oily water separator for preventing pollution.
9. Combustion and operating boiler.
10. Methods of checking level of boiler water and measures to be taken in case the water level alarmingly decreases.
11. Immediate measures in electric shock.
12. Detection and rectifying defect of pump and pumping system.
13. Detection and rectifying defects of equipments of engine and boiler room and engines.
14. Boiler water testing.
15. Handling and maintenance of auxiliary boiler.
16. Care and maintenance of steering system.
17. Care and maintenance of pumping system.
18. Care and maintenance of oily water separator.
19. (a) Structure, maintenance and handling of fire extinguishing equipments.  
(b) Detection and prevention of fire.

20. (a) Safe working in engine room.  
(b) Hazards of entering enclosed void space.
21. Operating responsibility in engine room routine operation and legal obligation.
22. Structure and functions of gear, clutch and other equipments of marine diesel engine.
23. Diesel engine cooling system, fuel and lubricating oil and auxiliary equipments, e.g., filter, pump, heat exchanger and control.
24. (a) Manoeuvring, controllable pitch propeller and bridge control system.  
(b) Emergency control.
25. Structure and functions of air compressor, air receiver and auxiliaries.
26. Operating, testing and rectifying defects of automatic control system and alarm panel.
27. Determining power and running adjustments of engine for efficiency.
28. Safe and effective operation and maintenance of marine diesel engine.

### **Marine Engineer Class-1 & Class-2**

#### **A. Written Examination (for Marine Engineering Officer Class-2)**

##### **Subject - 1: APPLIED MECHANICS**

1. **Friction** : Category of friction, Kinetic and limiting values of friction force, Apparent friction force when considering rolling resistance, Effect of area and different surface on dry friction, Effect on friction force of lubricant viscosity, Velocity of sliding, area of contact, boundary friction, Effect of heavy loading and low speed on bearings working under boundary conditions.
2. **Inertia**: Mass in terms of inertia, Inertia force, active and reactive forces, components of tractive resistances.
3. **Circular Motion**: Centripetal force, centrifugal force, Similarity between conical pendulum and single engine governor, Effect of centrifugal force on the rim and effect of a flywheel, integration between two forces on both flanks of a pivoted beam, Dynamically balancing of two masses rotating on the same surface, method of balancing a disc, dynamic force of bearings, highest and lowest force on bearing.
4. **Periodic Motion** : Variations of velocity and acceleration of a piston in a reciprocating engine, Simple Harmonic motion, Periodic Time, Frequency, Amplitude, Harmonic motion in common mechanism.
5. **Dynamics of Rotation**: Linear and angular acceleration, relation between angular velocity and time when uniform acceleration takes place, radius of gyration, accelerating, driving and braking torque in solid disc, hollow shaft, flywheel.
6. **Work and energy**: Work done, Conservation of energy, Kinetic energy of rotation, function of flywheel and governor.
7. **Impulse and momentum**: Linear and angular impulse and momentum, Thrust and power developed by a jet.

8. **Hydrostatics:** Centre of pressure, First moment and second moment of wetted area to find distance of centre of pressure from water surface, Forces at top and bottom bulkhead when flooded on one side and two sides but to different heights.
9. **Hydraulics:** Rate of flow- Bernoulli's equation, pressure energy, potential energy, Kinetic energy, Liquid head, Equation of continuity for an incompressible fluid, Equation for the mass flow rate of a liquid, Flow rate and pressures in sloping and horizontal pipes of varying diameter, Laminar flow- Definition of laminar flow and viscosity, Features of low-viscosity flow of viscous fluids. Turbulent flow- Developments of flow patterns as liquid velocity is increased until turbulence occurs; Critical velocity, Factors effecting turbulent flow, Development of eddies, Venturi meter, Equation of flow rate through a venturi meter, Constant of meter, Relation between flow rate and head loss, Effect of friction in the meter, Flow rate through small orifice, Co-efficient of discharge.
10. **Direct Stress and strain:** Stress, strain, elasticity, Hooke's Law, Young's modulus of elasticity, Ultimate tensile strength, Working strength, Factors of safety, Tensile Test, Compound bars, restricted expansion.
11. **Strain Energy:** Resilience, Relation between load and extension, Strain energy in an loaded elastic bar, stress produced by impact load, stress and strain produced by a suddenly applied load.
12. **Stress in pressure vessel:** Hoop stress and axial stress in thin walled cylindrical pressure vessel, stress in shell of spherical pressure vessel, joint efficiency.
13. **Shear and Torsion:** Shear stress, Shear strain, Relationship between shear stress, radius, modulus of rigidity, angle of twist, and lengths; Applied torsion and polar second moment of area of solid shaft; Relation between angle of twist and length, Power transmission in terms of torque speed of rotation.
14. Shear force and bending moment, shear force concept, sign convention, shear force diagram, Bending moment concept, sign conventions, shear force diagram, conditions of equilibrium, simply supported bars and cantilevers, concentrated and distributed loading.
15. **Stress in bending beam:** Neutral axis, Assumption concerning the bending of an elastic beam, distribution of stress and strain in beam, fundamental bending equation, Modulus section.
16. **Combined bending and direct stress:** Principles of superposition stress and its limitation, total stress due to bending and direct stress, Separate and combined stress diagram, Tensile and compressive stress in application of combined bending and direct stress found in Marine Engineering.

## Subject - 2: **Applied Heat**

1. **Steady flow energy equation:** Conversion of energy, Steady Flow Energy Equation- (SFEE), forms of energy, Potential energy, Kinetic energy, Internal energy, displacement energy, Heat transfer, external work done.
2. **Laws of Thermodynamics:** 1<sup>st</sup> and 2<sup>nd</sup> law, and its application.

3. **Vapours:** Vaporization maintaining changeable pressure of water, Conversion of liquid in to vapour by excessive heating, Enthalpy diagram, effect of compression gas and vapour at constant temperature, liquefaction of vapour, effect of throttling a dry saturated vapour.
4. **Behaviour of gases:** Boil's and Charles's Law; characteristics of equation of perfect gas; Specific heat capacity at constant pressure and volume, Adiabatic, isothermal and polytropic contraction and expansion, Dalton's Law of Partial Pressure.
5. **Thermal Efficiency:** Reversible process, Theoretical Thermal Efficiency, Carnot Cycle and Carnot Thermal efficiency.
6. **Steam Plant:** Thermal Efficiency of boiler, boiler efficiency, steam flow rate, Fuel combustion rate, Calorific value, Equivalent Evaporation of Boiler, Ranking Efficiency.
7. **Nozzles:** Convergent, Divergent nozzle, Convergent Nozzle.
8. **Engine Trials Data:** Dynamometer, mean effective pressure, Indicated power, Brake Power, Friction Power, Mechanical Efficiency, Specific fuel consumption, air standard efficiency.
9. **Refrigeration:** Practical refrigeration cycle, Pressure- Enthalpy Diagram, Heat transfer in evaporator and condenser, Throttling process, enthalpy table, Co-efficient of performance.
10. Conduction, Convection and Radiation, Heat Transfer Equation, Heat across a two layer composite wall, temperature across a surface film.
11. **Air Compressors:** Single Stage and Multi-stage Air Compressor, Intercoolers, P.V. Diagram, Ideal Isothermal Compressor, Polytropic Compression, Clearance volume, volumetric efficiency, free air delivery. Swept volume and effective swept volume.

Subject - 3: **ELECTROTECHNOLOGY:**

Section-A: **Electro technology and Electronics:**

1. **Network Theorems:** Ohm's Law, Karshof's Law, Maxwell's Circulating Current Theorem, Thevenin's Electric Superposition Theorem, and Whetstone's Bridge Circuit.
2. **Electro magnetism:** Magnetic fields, magnetic field strength, magnetic and non-magnetic cores, flux and flux density, Ampere turn, magnetic fringing, magnetic leakage, Hysteresis loss, eddy-current loss, flux linkages, permeability, Farad's theorem and Lyngge's theorem.
3. **Inductances:** Electro impedances, inductive reactance, circuit by pure resistance, pure inductance, series of resistance and inductance, power factors, true and apparent power, inductive impedance in series.
4. **Capacitance:** capacitive reactance, circuits with pure capacitance, inductive resistant and capacitive resistant series, resonance.
5. **D.C. Generator:** Field System and Armature, E.M.F equation, categories—permanent, separately excited; Shunt, Series and compound connected Generator.
6. **D.C. Motor:** Left hand theorem of Fleming, directions of force, back E.M.F. voltage, current and speed equation, speed controlling factors, Shunt, series, compound, Cumulative and differential connection of fields, electro-mechanical features, and motor starter.



7. **Semiconductors:** Basic Theory, Co-valent bonding, electric conduction control, intrinsic conductivity, P-type and N-type materials, P-N Junction Diode, forward bias and reverse bias.
8. **Rectifiers:** Diode features, full wave rectifier, dual diode and four-diode Bridge with centre-tape transformer.
9. **Zener Diodes:** Reverse bias characteristics, voltage stabilizer, regulation, stability.
10. **Transistors:** Features of transistor, operation, current transfer ratio, circuit configuration, load lines, leakage current, Practical Amplifier, Transistors as switch.
11. **Silicon controlled Rectifier:** Theory of operation, Controlling Methods.
12. **Alternators :** Manner and type of stator winding, armature reaction, speed-frequency equation, E.M.F. equation, effect of winding distribution, voltage regulation, parallel operation, load sharing.
13. **Single phase R-L-C circuits:** Resistance, inductance, capacitance, inductive reactance, capacitive reactance, impedance, phase angle, power factor, reactive power, resonance frequency, mutual inductance.
14. **Three phase A.C. :** wave forms, star method or Delta method, balanced load and unbalanced load, Line and phase voltage and current, power factor, true and apparent power.
15. **Load Sharing by Alternators:** Phase angle, Synchronizing current, power and torque, load distribution, busbar loads.
16. **Transformers :** Operating formulae, equation of transformer, voltage and turns relation, current and turns, diagram of transformer- without or with load—Phasor diagram, Phasor diagram for primary and secondary, efficiency, equivalent circuit, open circuit test, short circuit test, voltage regulation, instrument transformer voltage and current, voltage transformer, auto-transformer.
17. **Induction Motors :** Construction: squirrel case rotor and wound rotor, operating procedure, rotating magnetic field, direction of rotation, no. of poles and synchronous speed, primary characteristics, motor under load, Rotor e.m.f. and current, active power flow, efficiency, copper loss, mechanical power, motor torque, torque and rotor power factor, torque under running condition, Maximum precaution when running, torque and slip relationship, equivalent circuit of rotor, Comparison of cage and slip-ring rotor.
18. **Synchronous motor:** Preparation, operating and starting of a synchronized motor. Motor on load, torque developed by motor, effect of variation of excitement, important features.

Section-B: **Electrical Engineering:**

1. **Emergency Power Supply:** Requirements of passenger and cargo ships, Battery-lead Acid and Alkaline in emergency; Trickle Charge and float charge, battery compartments. Emergency and standby duties, Trials and Tests.
2. **Electrical Maintenance:** Electrical diagrams, Electrical safety, electric shock, Insulation resistance, circuit testing, continuity testing, Multimeter, Diode Test, Current clamp meter, Live line Tester, Maintenance of generator, motor and main control, feeder and starter panels.

3. **Electrical Distribution:** Distribution and Cable system-D.C. & A.C., Alternator and motor in three wire system, Power frequency, Insulated and earthed neutral system, Earth faults, earth fault protection, HRC fuse, re-wirable fuses, miniature circuit breaker, Moulded case circuit breaker, Shore supply connections.
4. **Electrical Cables:** Materials for conductor and insulation, effect on insulation, multi-stranded and single wire cables, Sheathing electric cables, means to reduce radio interference, flexible cords and cables, cable runs.
5. **Lamps:-** Principles of incandescent, gas discharge, Fluorescent and Neon lamps, general requirements for places of urgent light, requirements of circuits of navigation lights.
6. **Electrical Equipments in Flammable Atmosphere:** Explosion Protection--- flame proof, increased safety, intrinsically safe, pressurized, non-sparking, special protection, dangerous or hazardous spaces. Pump room and battery room lighting, protection of electrical equipments in gas hazardous space. Electrical testing in hazardous area.
7. **A.C. Motor :** Induction motor, Synchronous motor, slip-ring motor, Starter—Direct online, Star-delta and Auto-transformer, Overload protection—thermal relays, magnetic relays, temperature sensing devices—Thermistor, thermocouple, thermostat, Single phasing, 3.3 KV motor and 6.6 KV motor, High vacuum contractors.
8. **A.C. Generator:** Operating theories, constructions, parallel operation, power sharing, excitation, functional and error operated voltage regulating systems, automatic voltage regulation, generator protection, Min circuit breaker- operation and interlocks.

Subject - 4: **Naval Architecture:**

1. **Floatation:** Archimedes theory, buoyancy and reserve buoyancy, shift in centre of buoyancy, TPC, effect of different water densities, fresh water allowance, Load line, draft marking and allowances.
2. **Movement of Centre Gravity:** Centroid and centre of gravity, determining centroid of empty vessel, effect of movement of mass, Relation between KB and KG, Virtual changes in KG, Cargo and ballast operations.
3. **Form and Features:** Form co-efficient, Co-efficient of fitness of water plane area, Midship co-efficient, Block-co-efficient, Indices—application of Simpson's 1<sup>st</sup> and 2<sup>nd</sup> theories, centres, volumes and areas of ship shapes, moments of area, moments of inertia, T.P.C. and displacement.
4. **Transverse statical stability :** Heel and list, Metacentre and meta-centric height, equilibrium and stability- state equilibrium, unstable equilibrium, neutral equilibrium, stiff and tender ships, angle of loll, Moment of statical stability, Righting moment, Righting lever, statical stability at small angles of heel, KB, BM and metacentric diagram, List-sequence of vents due to movement of mass, List-correction, inclining experiment, Approximate GM be means of Rolling period tests, effects of liquid on stability, free surface effect, stability at large angle of heel, stability of wall sided ship, Stability Diagram—features and usage, simplified stability data, Representation of ship states.
5. **Transverse Dynamical Stability:** Definition, full stability diagram, effect of wind and tide, effect of cargo shifting.

6. **Longitudinal Stability** : Centre of floatation, Trim and change in trim, Moment to change Trim-MCTI, Cargo measurement and soundings, change in vessel speed and change in water density.
7. **Damage Stability**: Freeboard and reserve buoyancy, inundation at compartments, subdivision—floodable and permissible length, Permeability of spaces, Effect of flooding on transverse stability—Unsymmetrical flooding, effect of flooding on trim, free surface effect and centre of gravity on slack Tanks, ice formation on superstructure, Water absorption by deck cargo, retention of water on deck, emergency procedure following hull damage.
8. **IMO recommendations concerning ship stability**: Minimum stability requirement in the light of load line rules, application of IMO grain regulation, stability requirements flowing damages of passenger vessels, minimum stability requirement due to wind healing.
9. **Grounding and Dry-docking** : Grounding at single point, load and stress on ship structure, stability as water level falls, application at dry-docking, required condition of ship at the entry in dry-docking, Lining-up and ship-supporting, critical condition during docking or grounding.
10. **Motion and Stabilization** : Six degree freedom, Unrestricted rolling on still water, factors affecting rolling and pitching, relation between period of roll and amplitude of roll, stabilizing devices and stabilizing methods--- active and passive.
11. **Resistance, Powering and Fuel Consumption**: Components of resistance, Geometric Similarity—Application, Fluid flow wake formation, Form and feature effects, propulsion requirements and efficiencies, Admiralty Co-efficient application, Relationship—Hull, engine, propeller, Specific fuel consumption and fuel Co-efficient, Daily and Voyage Fuel Consumption.
12. **Propeller and Propulsion**: Propeller Power and thrust, Apparent slip and Real slip, Wake, Thrust, Relation between powers, relation between mean pressure and speed, Measurement of pitch, Cavitation built, Solid Propeller, types of propeller—Controllable pitch propeller, Contra-rotating propeller, Vertical axis propeller; Hydraulic Thrust Unit, Controllable Pitch Thrusters.
13. **Rudder, Steering and ships response** : Neutral Point and rudder Location, Fords on Rudder and Centre Effort, Ship behaviour during Manoeuvring-Angle of heel due to force on rudder, angles of heel while turning; Torsion and bending in rudder stock—Torques at different rudder angles and running astern; Rudder types, Special rudders and arrangement.
14. **Ship Girder**: Midship Section, Comparison with T-section Beam, Resistance to Bending and Shearing, 2<sup>nd</sup> moment of Resistance.
15. **Hull Distortion**: Static and Dynamic Loading, Structure Response; Force, Stress, deflexion; deflexion estimation.
16. **Bulkhead Loading**: Hydrostatic loading, Centre of Pressure, Shear force and bending moments, Stress in Welds.
17. **Ship Trial**: Preparation of ship, Conditions for the Course, conditions for conducting trials, Range of trials, data presentation.

18. **Ship Building Materials:** Low Carbon and Higher Tensile Steels, Castings and Forgings, Aluminium Superstructure, Methods of welding, methods of material protection.
19. **Ship Structure:** General information: features of various types of vessels and functions, General Cargo ship, Tanker, Container vessel, chemical tanker, liquefied gas tanker, bulk carrier, ro ro ship, passenger ship. Size, space and various vessel terms, On-board plans-general Arrangements-GA, Shell expansion, Piping Arrangements, capacity plan, rigging plan. Construction—keel and bottom, shell and deck, bulk heads, bow and stern, scantlings- Machinery Foundations, tanks, Strengthening against pounding and panting, framing system—Frame, girder, double bottom, bilge, sounding pipe. components of ship— deck opening, Cargo-hold, Stiffening, Integrity, Superstructure, engine room, tank top, engine mountings.
20. **Vibration in ships:-** Synchronous or resonant vibration—causes and reductions.
21. **Survey:** Initial and Periodic Surveys, Dry dock survey, continuous survey, preparation for survey.

### Subject - 5: **Machine Drawing**

Drawing questions will be set on the basis of justifying worth of using projection's formulae. Candidate shall be asked for drawing a marine machinery plan, elevation and section or all these views. All necessary information will be furnished in questions for completing drawing. Following items will be followed as guidelines for engineering items, e.g.:-

- 1) Air inlet valve
- 2) Automatic valve.
- 3) Ballast Chest
- 4) Bilge Suction Strainer
- 5) Burner Carrier
- 6) Centrifugal Brake
- 7) Connecting Rod and Bearings
- 8) Compressor Piston and Suction Valve
- 9) Control Valve
- 10) Crane Hook
- 11) Crosshead and Guide Shoe
- 12) Cylinder Relief Valve
- 13) Feed Check Valve
- 14 ) Flow Regulator
- 15) Fuel Valve
- 16) Fuel Control Lever
- 17) Full Bore Safety Valve
- 18) Gauge Glass (Plate Type)

- 19) Gear Pump
- 20) High Lift Safety Valve
- 21) Hydraulic Steering Gear
- 22) Machining Fixture
- 23) Machined Block
- 24) Main Gear Wheel
- 25) Mechanical Lubricator
- 26) Michell Thrust Block
- 27) Oil Strainer
- 28) Parallel slide Stop valve
- 29) Pedestal Bearing
- 30) Piston 4 stroke
- 31) Piston Upper and Rod
- 32) Piston Type Stop Valve
- 33) Quick Closing Valve
- 34) Reducing Valve
- 35) Rudder Carrier Bearing
- 36) Sealed Ball Joint
- 37) Starting Air Valve
- 38) Starting Air Pilot Valve
- 39) Stern Tube and Tail Shaft
- 40) Telemotor Receiver
- 41) Tunnel Bearing
- 42) Turbine Flexible Coupling
- 43) Universal Coupling
- 44) Valve Actuator.

## **Subject - 6: Engineering Knowledge (General)**

### **Section-A: Auxiliary Machinery**

1. **Pumps and pumping system:** Types, Construction, Characteristics, N.P.S.H., Head Calculation, Pump and fittings for Deep tank ballast, Cargo Pumping, Bilge separation, Bilge Injection, Fire main system, Fuel and lubricating system, Central Priming System.
2. **Heat Exchanges:** Tubular Types, Plate Type, Corrosion prevention, Heat expansion, Tell-Tale Hole, Parallel flow, Counter flow.
3. **Steering Gears:** Requirements, Telemotor System-- Hydraulic and electric, Power Unit— Heli Shaw Pump, Rudder Actuator, Ram type and Rotary Vane Type, Hunting gear, rudder carrier bearing, checks and tests.

4. **Pollution and pollution prevention:** MARPOL Regulations concerning marine engineering procedure. Bilge and ballast water discharge, bunkering, oily water separator, Coalescer filter, Oil Content (PPM) Monitor, Oil discharge (rate) monitor, Alarm and shut down, Sewage Plant, Retention, Vacuum Transportation, Biological treatment, Chemical treatment, liquid and solid waste incinerator, Oil record book.
5. **Refrigeration and Air conditioning :** Onboard plant, Refrigerant, vapour compression, cylinder cut off, rotary shaft gland, System performance, operating problems, correction of operating problems, Brine and brine system, Refrigerated cargo transportation, Air conditioning and ventilation, Psychometric Chart, Comfort Zone.
6. **Shafting:** Alignment, Shaft hardness, tail shaft, Stern tube, Thrust lock, vibration.
7. **Fresh Water Generator:** Flash Evaporator, Operation procedures, materials, Control of Evaporators, Reverse Osmosis.
8. **Deck Machinery :** Windlass, Winch and Capstan, Crane, Swinging Derrick, Speed Control, Fail-safe brake, Dynamic brake, duties of automatic mooring winch, Principles of Grab operation, Attachment of two cranes in container handling, maintenance, safety trips, emergency lowering.
9. **Technology of Materials:** Metallurgy of Steel and iron, features and testing of materials, heat treatment of metals, mixed substances in iron and steel, non-ferrous metals, non-metallic materials, welding techniques and correction of defects.

#### **Section-B: Control Engineering**

1. **Instrumentation and Control Technology:** Controller, process, measuring element, correcting element. Measured Value, Set value, Deviation, Offset, Proportional band, gain, reset or integral action time, rate or derivative action time.
2. **Measuring Element:** Heat, pressure, flow, level and other's measurement. Differential pressure cell.
3. **Transmission of Signal:** Electronic signal, pneumatic signal, transmitter, Transducer Linear Variable Differential Transmitter (LUVT), electro-pneumatic converters.
4. **Final Controlling Elements:** Diaphragm operating control valves, Direct and reverse acting actuator, Valve positioner.
5. **Control Theory :** Mode of control-continuous, step by step; principal elements, correcting and measuring units, Two step control, proportional action, integrated function, Integrated action, Integrated action with proportional (P +I), derivative action, Action in association with proportional, integral and derivative (P+I+D), split range control, cascade control.
6. **Pneumatic Controllers:** P+I controller, P+D controller, P+I+D Controller (three-step controllers), pulse controller, relays, alignment and tuning, calibration.
7. **Electronic Controllers:** Operating principles, Fault monitoring- faults of CPU, ROM, RAM, etc., pick up, actuator, detachment, power source, mode of control- general, index mode, high gain mode, test mode.
8. **Shipboard Control System:** Single Element Control for cooling Water, Split range cooling system for fuel Valve coolant, two element cascade control for system for piston cooling, Temperature control for lubricating oil, Control system for purification of boiler fuel oil, Fuel

oil viscosity control, Refrigeration chamber temperature control, interface level control of oily water separator, lighting-up sequence of an automatic combustion system of an auxiliary boiler, routine test, maintenance and fault detection.

9. **Main Engine Remote Control System:** Types: Electric, electro-pneumatic, electro-hydraulic, pneumatic, alarm, slow down of engine speed, shut down of engine. Transfer of control from one station to other, communication between bridge and engine control room.
10. **Control Air Supply:** Air system for control and equipment, pressure regulating valve, air quality, means of drying.
11. **Diesel Engine Governors:** Mechanical Hydraulic Governor, Electronic Governor, Load sensing governor, speed droop.
12. **Monitoring System:** Sequence of alarm signals, routine checks, alarm scanner, data logger.
13. **Digital Electronics:** Binary numbers, logic gates, operation formulae.

#### Section-C: **MARITIME LAWS & SHIP PERSONNEL MANAGEMENT**

1. **Maritime Laws:** General knowledge about International Maritime Laws and National Marine and ship laws. Basic concept:- IMO, Marine administration-Flag state control and port state control. Classification Society and Survey, necessary certificates and documents that have to be kept on-board as per requirement of international conventions. Responsibilities and duties under conventions: SOLAS, MARPOL, LL, ILO, FAL, HIR. National maritime acts-BMSO, BMFO, ISO & DOS-notice.
2. **Safety of ship & security of crews:** Knowledge about compulsory safety equipments for the security of vessel, fire organization, fire drill, ship abandon drill, maintenance of life saving aids and fire extinguishing equipments.
3. **Emergency Control Plan :** Contingency plan to meet emergency, fire prevention in specialised places, rescue operation from confined space, damages in rough weather, rescue of life from other ship in rough weather, leakage or spillage on ship from hazardous cargo, stranding of ship, abandoning ship, emergency in port, flooding compartments.
4. **Crew Management Onboard :** Management of ship personnel, control of the subordinates and maintaining amicable relation, idea about staff, exercise of authority, collective behaviour, conditions of appointment, staff organizations—Manning arrangement, Functions arrangement, staff allocation, safety and readiness for emergency, preparation for staff duty, training in ship—Techniques and management, drills.
5. **Medical First Aid onboard:** Concept of international medical guide for medical care onboard, medical first aid used in accident caused by handling hazardous cargo.
6. Knowledge about leadership, team work and management skill.

#### Subject 7: **Engineering Knowledge (Motor)**

##### Section-A: **Internal Combustion Engine:**

1. **Engine Performance:** Rated power, Maximum continuous rating-MCR, Torque Rich Zone, Specific Fuel consumption, Power Calculation, Indicated power, Brake Power, Brake Thermal Efficiency, Indicator diagram, Power Card-P.V. Diagram, draw card, Out of phase card, Light Spring Card, Power Balancing.
2. **Engine Components:** Bedplate, Holding-down bolts and chocks, Crankshafts, Bearing, Tie-bolt, cylinder liner, connecting rod, piston, piston ring, cylinder head and valve, Entablature, A-Frame.
3. **Lube Oils:** Organic and chemical features of Lube Oil, Viscosity, Viscosity Index, TBN, Power Point, Oiliness, Detergency, dispersal, foaming, Extreme pressure, etc. Oil refining, lubrication and lubrication problem i.e. scufing, pitting, Emulsifying, oxidation, lacquering, etc. and testing, water content, contamination, depressiveness, Alkalinity, etc, Grease.
4. **Fuel Oils :** Pure oil refining from crude oil (Kerosene, gas oil, residual fuel oil, lubricating oil), Petroleum substances, oil's crude and chemical features. Viscosity, density, flash point, pour point, Calorific Value, Testing, Oil purification, treatment methods, Blending, Ignition quality, (Octane number, CCAI), problems- knocking, water, aluminium, asphalt, ash, sulphur, Vanadium Pantoxide, Sodium.
5. **Fuel Injection:-** Fuel Injector and Fuel Pump, Jerk Fuel Pump, Injection Timing-constant and variable, Needle lift, Fuel pressure and Cam Lift, Requirements for good ignition delay.
6. **Scavenging and Supercharging :** Scavenging system of 2-stroke and 4-stroke engines, Exhaust System, Turbo Chargers—Air filter, Inducer, Impeller, Diffuser, volute casing, Knowledge, turbine wheel and blades, protective gratings, labyrinth glands, gland seal, impeller seal, anti corrosion plug, turbo charger functions. Surging, vibration, Grit clearing of gas side, immobilization of turbocharger.
7. **Starting and Reversing :** Starting system of Marine Diesel Engine, Starting air valve, Starting air distributor, Automatic Starting Air Valve, Admission period of starting air, Starting air overlap, Safety features of pipeline, Safety interlocks at Propulsion diesel engine operation. Reversing system-gear clutch, Axial Camshaft shifting, fuel pump roller shifting,
8. **Cooling system:** Cooling of fuel valve, cylinder, exhaust valve, turbo charger, piston and combustion air, etc. Coolants (fresh water, sea water, cooling oil), chemical treatment.
9. **Diesel Engine Control:** Direct Reversing Engine, Engine Governor, Over speed trip, Flywheel, UMS operation, Remote control from bridge and control room.
10. **Multi Engine Propulsion System:** Gear coupling for main propulsion, Pumping and Electric Power generation, Fluid coupling, Reverse coupling, Flexible coupling.
11. **Hazards in Engine Operation:** Crankcase explosion, explosion door, oil mist detector, scavenge fire, starting air explosion, cylinder relief valve, black smoke in exhaust, oil level change, crankcase noise, leakage of exhaust valve.
12. **Balancing, vibration and noise :** Equilibrium law, partial equilibrium in using rotating mass, kinds of vibration, critical speed, resonance, Torsional vibration damper, Protection from excessive noise.



13. **Compressed Air system:** Compressor-Single stage and multi stage, Pressure relief valve, Bursting disc, Inter cooler and after cooler, automatic drain, Operation and maintenance, Air reservoir-making standard, Mountings and safety fittings, Inspection and maintenance.

Section- B: **BOILERS**

1. **Types of Boiler and Waste heat Utilization:** Composite boiler, alternatively fired boiler, Multi boiler waste heat system, Dual pressure force circulated multi boiler waste heat system, packaged boiler.
2. **Boiler Mountings:** Mountings, Safety valves, Feed check valves, Water level Gauge-Local and Remote.
3. **Corrosion in boilers and water treatment :** Electro-chemical corrosion, dissolved oxygen, acidity, Infiltration of animal and vegetable oils, Mechanical straining, Copper deposit, Caustic embitterment, Scale formation, conditioning chemicals and procedures, water test Phenapthalayne alkalinity, total Alkali nits, caustic Alkalinity, Chloride, Sulphite, Phosphite, solidity, P.H. Value, dissolved Oxygen, dissolved solid substances, Hydrazine].
4. **Combustion in Boilers:** Burners, combustion control, Air fuel ratio controller.
5. **Boiler operation:** Firing from cool condition, Level gauge blow down, Boiler blow down, taking out of service.
6. **Boiler survey and maintenance:** Boiler faults, Wastage, Crack, Water filled experiment and bare eyed Inspection, survey procedures and intervals, Reform and maintenance procedure.

**B. Oral examination (Marine Engineer Officer Class-2):**

- (1) Working Principles and Constructional details of—
  - (a) Water gauge of boiler.
  - (b) Sensing and monitoring system attached to marine equipments.
- (2) Bilge and ballast pump, pumping and priming, environmental pollution aids.
- (3) (a) Propulsion shifting system, thrust and shaft bearing, stern tube and propeller.  
(b) Hull Inspection and dry docking.
- (4) (a) Steering and Stabilising system with thrusters.  
(b) Steam turbine, gearing and lubricating system, steam movement system and related apparatus.  
(c) Reverse operating.  
(d) Auxiliary steam boiler and related aids.  
(e) Water test of boiler and conditioning.  
(f) Control and alarm system related with automatic steam plant operation.

- (5)
  - (a) Marine Diesel Engine (Trunk and Cross Head Type) gearing system and clutches.
  - (b) Starting and reversing system.
  - (c) Cooling and lubricating system.
  - (d) Preparation of use of fuel oil for using.
  - (e) Air compressor, receiver and related equipments.
  - (f) Auxiliary diesel engine and related equipments.
  - (g) Control regarding operating diesel plan automatically and alarm.
  - (h) Calculation engine power and adjust in running condition for retaining efficiency.
  - (i) Safe and sound operating of tools and equipments used in specially hazardous goods.
- (6)
  - (a) Knowledge about published and revised code of safe working practices.
  - (b) Knowledge about safety at sea, information issued by DOS.
- (7) Knowledge about code of safe working practice concerning transportation of hazardous goods.
- (8)
  - (a) Precautionary measures against fire explosion, explosive compound and source of flame.
  - (b) System for prevention of spreading fire, detection and extinguishing.
  - (c) Detection and maintenance of fire detection and extinguishing measure.
  - (d) Test of firemen outfit and breathing apparatus.
  - (e) Fire pump and its handling, maintenance and test.
  - (f) Organization and control of fire and damage control.
- (9) Safe and sound operating in UMS condition.
- (10) Rectification of faults and operating system related with electric system.
- (11) Knowledge of personal Management, organisation and on-board training.
- (12) Knowledge of various conventions, recommendations of IMO and national regulations.

Candidates who were certified competency of Marine Engineer Officer Class-2 before this rules amendments have come into effect, they have to qualify in written examination in Engineering Knowledge (General) and Engineering Knowledge (Motor) under previous syllabus along with present syllabus in the Marine Officer Class-1 examination.

**C. Oral examination (for Chief Engineer Endorsement on Marine Engineer Officer Class-2 Certificate):**

1. Marine Diesel Engine control and monitoring equipments.
2. Propulsion system operation, testing and maintenance.
3. Pumping system, cooling system and stabilising.
4. Steam plant: Boiler, accessories, water treatment.
5. Marine diesel plant operation and maintenance.
6. Safe Work Code.
7. Fire and safety: Testing, protection, devices, hazards, management.
8. Machinery Control: UMS operation and troubles.
9. Present electric power plants and alternators of ship.
10. Deck machinery: Crane, Anchor, and Hatch Cover.
11. Dry docking procedure and documentation.
12. IMO conventions and DOS publications:- MARPOL, SOLAS, STCW, BMSO and others.
13. Administrative responsibilities of Chief Engineer:
  - Leadership and management skill
  - Handover and takeover of watch duty.
  - Awareness of directives and circulars issued by the company.
  - Repair, maintenance and survey.
  - Knowledge of reporting on conditions of machinery/ accidents/ findings, etc.
  - Bunkering, fuel calculation, requisition, documentation.

**D. Oral examination (for Marine Engineer Officer Class-1):**

1. Marine Diesel Engine control and monitoring equipments.
2. Propulsion system operation, testing and maintenance.
3. Pumping system, cooling system and stabilising.
4. Steam plant: Boiler, accessories, water treatment.
5. Power calculation, balancing.
6. Marine diesel plant operation and maintenance.
7. Fuel and Lubricant—Properties and care.
8. Safe Work Code.
9. Fire and safety: Testing, protection, devices, hazards, management.

10. Machinery Control: UMS operation and troubles.
11. Present electric power plants and alternators of ship.
12. Electrical Circuits, devices and fault findings.
13. Dock machinery: Crane, Anchor, and Hatch Cover.
14. Shafts, Rudder, Propeller.
15. Dry docking procedure and documentation.
- 16) IMO conventions and DOS publications:- MARPOL, SOLAS, STCW, BMSO and others.
- 17) Administrative responsibilities of Chief Engineer:
  - Leadership and management skill
  - Handover and takeover of watch duty.
  - Awareness of directives and circulars issued by the company.
  - Organising emergency training for staff in normal and emergency situation.
  - Repair, maintenance and survey.
  - Planned maintenance system—PMS.
  - Knowledge of reporting on conditions of machinery/ accidents/ findings, etc.
  - Concept about ship inventory, documentation, filings, manuals.
  - Bunkering, fuel calculation, requisition, documentation.

### **MARINE ELECTRO-TECHNICAL OFFICER**

#### **A. Oral Examination:**

Electric Circuit Breaker, Thevin's theorem in superposition and networking system, circuits with non-linear elements, electromagnetic induction, magnetic circuit, mutual inductance, inductance and effect of voltage and current charge in circuit with resistant. B/H and B/ampere turn per meter curve and their effect in air gap magnetic circuit. Knowledge about quality of Hysteresis.

Electrostatics: types of capacitors, general series and parallel circuit, electric force and electric flux density, relative permittivity, a compositor set against a DC supply. Reserved power in capacitor, preparation for stable power.

Electronics: Characteristics of Junction Transistor.

Effect of voltage feedback on amplifier gain, input and output impedances, similar circuits.

General knowledge of Rectification, diode and Thyrintor and theory of phase flow. relation between current and voltage, use of current, voltage power and power factor in RLC circuit, impedance triangle, development of power factor, resonance, star and delta methods.

D.C. Machine: Armature reaction, speed control efficiency, Ward Leonard system and application, D.C. Motor, Motor starter—Types of Automatic /remote starter, calculation of starter.

A.C. Machine : Working principles and construction, salient pole, protection of cylindrical and brass-less alternator, production of rotating magnetic field, relation between number, speed and assumption of pole of machine, structure and function of an induction motor, Torch speed curve, wound, slip ring, case and double wound starting system.

Single Phase Transformer-functions and construction. E.M.F. equation and efficiency, auto-transformer and current transformer.

Functions of Hydraulic and Electro-hydraulic cranes, use of various circuits, Control engineering, PID, Control system and its application.

Main engine propulsion system, auxiliary engine, steering engine, cargo handling system, electrical and electronic circuits under deck machineries, its various control systems.

### **JUNIOR MARINE ELECTRO-TECHNICAL OFFICER**

#### **A. Oral Examination:**

Electric Circuit Breaker, Thevin's theorem in superposition and networking system, circuits with non-linear elements, electromagnetic induction, magnetic circuit, mutual inductance, inductance and effect of voltage and current charge in circuit with resistant. Knowledge about quality of Hysteresis.

Electrostatics: types of capacitors, general series and parallel circuit, electric force and electric flux density, relative permittivity, a compositor set against a DC supply.

Electronics: Characteristics of Junction Transistor, General knowledge of ziner diode and Thyrintor. Effect of voltage feedback on amplifier gain, input and output impedances, similar circuits.

A.C.Machine: Theory of flow of electricity and phases. Relationship between current and voltage, Current, voltage power and power factor, impedance triangle, development of power factor, star and delta systems on RLC circuit.

D.C. Machine: Armature reaction, speed control efficiency, Ward Leonard system and application, D.C. Motor, Motor starter.

A.C. Machine : Working principles and construction, salient pole, protection of cylindrical and brass-less alternator, production of rotating magnetic field, relation between number, speed and assumption of pole of machine, structure and function of an induction motor, Torch speed curve, wound, slip ring, case and double wound starting system.

Functions and construction of Single Phase Transformer. Auto-transformer and current transformer.

### Appendix-3

#### [Vide Rule 3(b)]

#### Prerequisites for Deck Officer Certificate of Competency

1. **Deck officer Class-1.** - Any person shall have to comply with the following requirements for Deck Officer Class-1 Certificate of Competency, viz:-
  - (a) Shall have Deck Officer Class-2 certificate of competency;
  - (b) shall have at least 36 (thirty six) months' approved sea-service after holding Deck Officer Class-3 certificate of competency as Navigating Watch Keeping Officer on board ship of 500 GT or more; or shall have at least 24 months sea service as Navigating Watch keeping Officer / Chief Mate on board ship of 500 GT or more, after holding Deck Officer Class-3 certificate of competency including at least 12 (twelve) months' approved sea-service as Chief Mate on board ship of 500 gross tonnage or more, after holding Deck Officer Class-2 certificate of competency;  
For unlimited certificate of competency, sea services mentioned above shall be completed on board ship of 3000 GT or more, otherwise Deck Officer Class-1 certificate of competency shall be endorsed with limitation for ship of less than 3000 GT.
  - (c) Shall have medical fitness certificate and eye sight test certificate as per rule 25 for working in the Deck department.
2. **Deck Officer Class-2.** - Any person shall have to comply with the following requirements for Deck Officer Class-2 Certificate of Competency, viz:-
  - (a) Shall have Deck Officer Class-3 certificate of competency;
  - (b) shall have at least 12 months' approved sea-service after obtaining deck officer class 3 certificate of competency as Navigating Watch Keeping Officer on board ship of 500 gross tonnage or more, after holding deck officer class 3 certificate of competency;  
For unlimited certificate of competency, sea services mentioned above shall be completed on board ship of 3000 GT or more, otherwise Deck Officer Class-2 certificate of competency shall be endorsed with limitation for ship of less than 3000 GT.
  - (c) Shall have to complete a approved training course including practical training on Ship Management, International Maritime Conventions, Maritime national laws and following subjects:
    - i) Completion of practical training course on Command Navigation, ARPA, RADAR and electronic navigation; and-
    - ii) Completion of approved Medical Care training course as per rule 17(2);
  - (d) Shall have medical fitness certificate and eye sight test certificate as per rule 25 for working in the Deck department.
  - (e) Any candidate, prior taking over charge as Chief Officer/Master, shall have to complete and be certified in an approved "Ship Handling Simulator course" ; In case of taking charge as Chief Officer/Master with previously issued certificates or certificate issued by foreign authority, shall have to complete and shall have certificate in an approved "Ship Handling Simulator course"; provided that, Director General, considering ability and

experience of the candidate, may exempt from the requirement of this course and certificate.

- (f) Shall have to participate and have certificate in approved Deck Officer Class-1 and Clas-2 combined preparatory training courses.
- (g) Shall have approved practical training course and certificate on Electronic Chart Display and Information System (ECDIS)

3. **Deck Officer Class-3.** - Any person shall have to comply with the following requirements for Deck Officer Class-3 Certificate of Competency, viz:-

- (a) Age not less than 18 years;
- (b) Passed in Higher Secondary (science) Certificate Examination or equivalent examination obtaining minimum 3.00 GPA (50% marks) with Physics and Mathematics from any recognised board/ authority.
- (c) Deck Cadet having completed one year or more, and two years or more approved pre-sea training from Marine Academy, Chittagong or any approved merchant marine training Institute shall have 12 months and 24 months sea service respectively in foreign going vessel of 500 GT or more and this shall be supported by training record book; or-
- (d) Other deck cadet shall have 36 months approved sea-service on board foreign going vessel of 500 GT or more and this shall be supported by training record book;
- (e) Deck Rating must have 42 months approved sea-service on board foreign going vessel of 500 GT or more and this shall be supported by training record book;
- (f) Candidates with following sea-service must have 36 months approved sea-service on board foreign going vessel of 500 GT or above and this shall be supported by training record book:-
  - (i) Retired Commissioned Officer of Executive Branch of Bangladesh Navy competing minimum 48 months' approved sea-service after commissioning on board Bangladesh Navy or Bangladesh Coast Guard ships of 24 meter or more in length; or,
  - (ii) Candidate holding Fishing Vessel Skipper Certificate of competency completing minimum 24 months approved sea service as Skipper on board fishing vessel of 24 meter or more in length after obtaining Fishing Vessel skipper certificate of competency ; or,
  - (iii) Candidates holding Deck Officer Class-4 Certificate of competency completing minimum 36 months approved Coastal vessel/ Merchant shipping sea-service on board ship of 24 meter or more in length after obtaining deck officer class-4 certificate of competency; or-
  - (iv) Retired rating candidate of Seaman Branch of Bangladesh Navy or Bangladesh Coast Guard shall have minimum 84 months approved sea-service on board Bangladesh Navy or Coast Guard ship of 24 meter or more in length.

However, Officer of Bangladesh Navy, fishing Vessel Skipper or Deck Officer Class-4 certificate of competency holder shall get exemption from foreign going merchant ship's sea-service of 12, 9 and 6 months respectively.

- (g) Shall have minimum 6 months' Navigating Watch Keeping service under the supervision of Master or authorised certificate officer holding certificate of competency along with minimum 100 hours steering certificate out of sea-service completed in foreign going merchant vessel.
- (h) Shall have to participate and shall have certificate in an approved preparatory course.
- (i) Shall have medical fitness certificate and eye sight test certificate for service in the deck department as per rule 25.
- (j) Candidate shall have participated and shall have certificate in the following ancillary courses, viz:-
  - i) Medical First Aid.
  - ii) Advanced Fire Fighting.
  - iii) Proficiency in survival craft and rescue boat,
  - iv) Efficient Deck Hand.
  - v) Radar Navigation (Operation level).
  - vi) Global Maritime Distress and Safety System-(General Operator course)-(GMDSS-GOC).
  - vii) Proficiency for Ship Security Officer.
  - viii) Navigational Aid and Electronic Navigation System.
  - ix) Electronic Chart Display and Information System (ECDIS)

4. **Deck Officer Class-4.** - Any person shall have to comply with following requirements for

Certificate of Competency as Deck Officer Class-4, viz:-

- (a) Age not less than 20 years;
- (b) Shall have Deck Officer Class-5 certificate of competency;
- (c) Shall have minimum 12 months approved sea service as Navigating Watch Keeping Officer on board ship of 24 meter or more in length after obtaining deck officer class-5 certificate of competency;
- (d) Shall have medical fitness certificate and eye sight test certificate qualified for service in the deck department as per rule 25.

5. **Deck Officer Class-5.** - Any person shall have to comply with following requirements for certificate of competency as Deck Officer Class-5, viz:-

- (a) Age not less than 18 years;



- (b) Shall have minimum 36 months approved sea service experience in Deck department;
- (c) Shall have to complete an approved training course along with practical training in the following subject:
  - i) Proficiency in survival craft and rescue boat,
  - ii) Advanced Fire Fighting.
  - iii) Medical First Aid, and--
  - iv) Medical Care.
- (d) Shall have certificate of competency in Global Maritime Distress and Safety System-(General Operator course)-(GMDSS-GOC)/(Restricted Operator Certificate)-(GMDSS-ROC);
- (e) Shall have medical fitness certificate and eye sight test certificate for service in deck department of the vessel as per rule 25.
- (f) Passed Secondary Certificate Examination (Science) or equivalent examination obtaining minimum 3.00 GPA (50% marks) with Physics and Mathematics from any recognised board/ Authority.
- (g) Approved sea service shall have been completed on board merchant ships of 80 GT or more; or 24 meter or more in length; including at least 100 hours Steering experience certificate.
- (h) Shall have participated and shall have certificate in an approved preparatory course as per combined syllabus of Deck Officer Class-5 and Class-4.
- (i) Shall have certificate in approved Radar Navigation (operation level) training course.
- (j) Shall have certificate in Efficient Deck Hand training course.
- (k) Candidate having certificate in approved pre-sea training from any approved merchant marine training institute shall have exemption of 6 months' sea-service.
- (l) Shall have approved practical training course and certificate on Electronic Chart Display and Information System (ECDIS)

[Despite anything contained in other rules, any examination or certification under these rules shall only be governed by these rules. All executive orders or circular issued previously pertaining to the functioning of these rules shall be null and void from the date of issue of these rules. The chief examiner may impose limitation on certificate of competency depending on ship type, tonnage, geographical area and medical condition if necessary]

**[Vide Rule 3(b)]**

**Prerequisites for Engineer Officer Certificate of Competency**

1. **Marine Engineer Officer Class-1.** - Any person shall have to comply with following requirements for certificate of competency as Marine Engineer Officer Class-1:-
  - (a) Shall have Marine Engineer Officer Class-2 certificate of competency;
  - (b) Any person holding certificate of competency as Engineering Watch Keeping Officer shall have completed minimum 36 months approved sea-service as Engineering Watch keeping Officer on board ship having main engine propulsion power of 750KW or more after obtaining marine engineer officer class-3 certificate of competency, or 24 months approved sea service including 12 months' sea-service experience as Second Engineering Officer of ship having main engine of propulsion power 750 KW or more after obtaining certificate of competency as Second Engineer Officer;  
For unlimited certificate of competency, sea services mentioned above shall be completed on board ship of 3000 KW or more main propulsion power, otherwise Engineer Officer Class-1 certificate of competency shall be endorsed with limitation for ship of less than 3000 KW main propulsion power.
  - (c) Shall have completed any approved training on ship management, International maritime Conventions and national maritime laws;
  - (d) Shall have medical fitness certified and eye sight test certificate for service in engineering department as per rule 25.
  
2. **Marine Engineer Officer Class-2.** - Any person shall have to comply with following requirements for certificate of competency as Marine Engineer Officer Class-2:-viz
  - (a) Shall have Marine Engineering Officer Class-3 certificate of competency;
  - (b) Shall have minimum 12 months' approved sea service on board ship having main engine propulsion power of 750KW or more after obtaining marine engineer officer class-3 certificate of competency;  
For unlimited certificate of competency, sea services mentioned above shall be completed on board ship of 3000 KW or more main propulsion power, otherwise Engineer Officer Class-2 certificate of competency shall be endorsed with limitation for ship of less than 3000 KW main propulsion power.
  - (c) Shall have completed any approved training on ship management, International maritime Conventions and national maritime laws;
  - (d) Shall have medical fitness certificate and eye sight test certificate for service in engineering department as per rule 25;
  - (e) Shall have participated and shall have certificate in an approved preparatory course as per combined syllabus of Marine Engineer Officer Class-1 and Class-2.
  
3. **Marine Engineer Officer Class-3.** - Any person shall have to comply with following requirements for certificate of competency as Marine Engineer Officer Class-3:-

- (a) Age not less than 18 years;
- (b) Passed Higher Secondary Certificate Examination (Science) or equivalent examination obtaining minimum 3.00 GPA (50% marks) with Physics and Mathematics from any recognised board/ authority;
- (c) Engine cadet candidate having completed two years or more and one year or more pre-sea training from Marine Academy, Chittagong or any approved merchant marine training institute must have minimum 12 months and 24 months approved watch keeping sea service respectively in foreign going vessel of main engine propulsion power of 750KW or more and shall be supported by training record book; or-
- (d) Other engine cadet candidates, shall have 36 months approved watch keeping sea-service at foreign going vessel at main engine propulsion power of 750 KW or more and it shall be supported by training record book; or
- (e) Engine rating candidates, shall have minimum 42 months approved watch keeping sea-service at foreign going vessel of main engine propulsion power of 750 KW or more and it shall be supported by training record book; or
- (f) Engine Cadet candidate having Bachelor degree in Marine Engineering, Mechanical Engineering or Naval Architecture from any government recognised university shall have minimum 12 months approved watch keeping sea-service at foreign going vessel having of main engine propulsion power of 750 KW or more and it shall be supported by training record book; or
- (g) Candidate with following of sea-service, shall have minimum 36 months approved engine room watch keeping sea-service at foreign going vessel of main engine of 750 KW or more and it shall be supported by training record book :
  - (i) Retired Commissioned Officer of Engineering Branch of Bangladesh Navy or Coast Guard competing 48 months' approved sea-service after commissioning on board of Bangladesh Navy or Bangladesh Coast Guard ship of 24 meter or more in length ; or,
  - (ii) Candidate completing minimum 24 months approved sea service as Fishing Vessel Chief Engineer Officer after holding Fishing Vessel Engineer Class-1 Certificate on fishing vessel of 24 meter or more in length; or,
  - (iii) Any candidate after holding Marine Engineer Officer Class-4 Certificate of Competency completing minimum 24 months approved Coastal vessel/ Merchant shipping sea-service; on board ship of 24 meter or more in length and
  - (iv) Retired rating candidate of Engineering branch of Bangladesh Navy or Bangladesh Coast Guard completing minimum 60 months approved sea-service on board ship of Bangladesh Navy or Coast Guard; of 24 meter or more in length including minimum 12 months approved Engineering Watch Keeping Certificate.

However, Officer of Bangladesh Navy, Fishing Vessel Class-1 Engineer Officer or Marine Engineer Officer Class-4 certificate of competency holder shall get exemption from foreign going merchant ship's sea-service for 12, 9 and 6 months respectively.

- (h) Candidate competed pre-sea training from any approved merchant marine training institute and candidate without any pre-sea training shall have 6 months and 9 months' training and certificate in mechanical, electrical, electronics and welding shop respectively.
- (i) Shall have participated and have certificate in an approved preparatory course.
- (j) Shall have to complete and be certified in Engine Room Simulator Course/ Computer based Engine Room Simulator Course. However, the director general, considering the experience and ability of the candidate, may exempt from the requirement of this course and certificate.
- (k) Shall have certificate in medical fitness and eye sight test certificate for service in engine department as per rule 25.
- (l) Any candidate shall have participated and hold certificate in following ancillary courses:-
  - i) Proficiency in Medical First Aid;
  - ii) Advanced Fire Fighting;
  - iii) Proficiency in survival craft and rescue boat;
  - iv) Personal Safety and Social Responsibility.

4. **Marine Engineer Officer Class-4.** - Any person shall have to comply with following requirements for certificate of competency as Marine Engineer Officer Class-4:-

- (a) Age not less than 20 years;
- (b) Shall have Marine Engineering Officer Class-5 certificate of competency;
- (c) Shall have minimum 12 months' approved Coastal/ merchant sea service as Engineering Watch Keeping Officer on board ship of 24 meter or more in length;
- (d) Shall have medical fitness certificate and eye sight test certificate as per rule 25; and

5. **Marine Engineer Officer Class-5.** - Any person shall have to comply with following requirements for certificate of competency as Marine Engineer Officer Class-5:-

- (a) Age not less than 18 years;
- (b) Passed Secondary Certificate Examination (Science) or equivalent examination obtaining minimum 3.00 GPA (50% marks) with Physics and Mathematics from any recognised board/ authority;
- (c) Shall have minimum 36 months approved sea service in engine department of coastal vessel of 24 meter or more in length;
- (d) Candidate having Diploma certificate in Marine Engineering shall have 12 months' approved sea service on board ship of 24 meter or more in length;

- (e) Shall have minimum 6 months' approved Workshop Practice Certificate in which Mechanical, Electrical or Electronics shop;
- (f) Shall have medical fitness certificate and eye sight test certificate as per rule 25;
- (g) Shall have certificate in Basic Safety Course / Ancillary course as per rule 11(2);
- (h) Shall have to complete an approved Class-4 and Class-5 Combined Preparatory Course;
- (i) Any candidate having pre-sea-training from any approved merchant marine training institute shall have exemption of 6 months' from the sea-service stated in aforesaid clause (c).

6. **Marine Electro-Technical Officer.** - Any person shall have to comply with following requirements for certificate of competency as Marine Electrical Engineer Officer:-

- (a) Age not less than 18 years;
- (b) Any candidate having Bachelor degree in Electrical Engineering shall have minimum 12 months' approved sea-service in any ocean going vessel as Junior Marine Electrical Engineer supported by training record book. Candidate having diploma certificate shall have approved sea sea-service as Junior Marine Electrical Engineer or Electrician in any ocean going vessel for 24 months or 30 months respectively and supported by training record book;
- (c) Shall have at least 3 months workshop practice course in Electrical and Electronics shop from any approved institute.
- (d) Shall have completed 4 basic safety courses as per rule 11(2).
- (e) Shall have medical fitness certificate and eye sight test certificate as per rule 25;
- (f) Shall have completed an approved Preparatory course from any Merchant Marine Training Institute.
- (g) Have participated training course and shall hold certificate in following ancillary courses, viz;
  - i) Proficiency in Medical First Aid;
  - ii) Advanced Fire Fighting;
  - iii) Proficiency in survival craft and rescue boat;

However, candidates having Bachelor or Diploma certificate, for the purpose of attaining required sea-service experience for obtaining certificate of competency, can take NOC of joining ship as junior marine Electrical Engineer Officer.

[Despite anything contained in other rules, any examination or certification under these rules shall only be governed by these rules. All executive orders or circular issued previously pertaining to the functioning of these rules shall be null and void from the date of issue of these rules. The chief examiner may impose limitation on certificate of competency depending on ship type, tonnage, geographical area and medical condition if necessary]

**Government of the People’s Republic of Bangladesh**

Certificate Issued under provisions of Bangladesh Merchant Marine Officers & Ratings Training , Certification, Recruitment, Work Hours and Watch keeping Regulation 2011 made under Bangladesh Merchant Shipping Ordinance 1983 and STCW Convention 1978 as amended in 1995

**CERTIFICATE OF COMPETENCY**

The Government of the People’s Republic of Bangladesh certifies that ..... has been found duly qualified in accordance with the provisions of regulation of the above Convention, as amended, and has been found competent to perform the following functions, at the levels specified, subject to any limitations indicated until ..... or until the date of expiry of the extension of the validity of this certificate as may be shown overleaf:

Functions	Level	Limitations applying (if any)

The lawful holder of the certificate may serve in the following capacity or capacities specified in the applicable safe manning documents issued by the Department of Shipping.

Capacity	Limitations applying (if any)

Official seal

Signature:.....

Name:

Chief Examiner (Deck /Engine).....

The validity of the certificate is hereby extended until .....	
Official seal	Signature.....
	Name.....
	Chief Examiner (Deck/Engine)

Attention is drawn to the provisions of the Bangladesh Merchant Shipping Ordinance whereby the fraudulent use of forgery, or alteration of this document could constitute a criminal offense.

Any person other than the holder coming in possession of this document is requested to send it to the Director General, Department of Shipping, 141-1433, Motijheel C/A (8<sup>th</sup> floor), Daka-1000, Bangladesh in an unstamped envelope. Postage will be paid by the addressee ----

Director General,  
Department of Shipping,  
141-1433, Motijheel C/A (8<sup>th</sup> floor),  
Daka-1000,  
Tel: +88 02 9555128  
Fax: +88 02 7168363  
E-mail: [dosadbd@bttb.net.bd](mailto:dosadbd@bttb.net.bd)

The original of this certificate must be kept available in accordance with regulation ½, paragraph 9 of the Convention while serving on a ship.

Name of holder:.....

Date of birth of holder: .....





## Appendix-6

### [VIDE RULE 10]

#### Pre-requisites for Dual Certificate of Competency:

1. General requirements:
  - (a) The candidate of any certificate shall have to take up relevant education and training and proper competency for discharging functions and levels referred to in any certificate.
  - (b) The candidate of any particular certificate shall complete appropriate sea service mentioned in this annexure for the functions and levels referred to in that certificate.
  - (c) If any person, after attaining dual certificate of lower level, intends to higher level of Engineering or Deck Certificate, conditions of appendix -3 or appendix-4 shall apply in that case.
  - (d) If any person, after having certificate as per appendix -3 or appendix-4, intends to attain dual certificate as per appendix-6, at first he has to comply requirements of certificates for Deck officer or Marine Engineer officer Class-3 and class 2 serially and then shall attain proper Deck officer or Marine Engineer Officer Certificate of Competency.
2. **Pre-requisites for obtaining Deck Officer and Marine Engineer Officer Dual Certificate of Competency:**
  - (1) Marine Engineer Officer Class-1 and Deck Officer Class-1 dual Certificate: Any person shall have to comply with the following requirement for obtaining Marine Engineer Officer Class-1 and Deck Officer Class-1 dual Certificates of competency:
    - (a) Shall have dual certificate of competency as Marine Engineer Officer Class-2 and Deck Officer Class-2 of any ship of 3000 GT or more and main engine propulsion power of 3000KW or more.
    - (b) After obtaining dual competency certificates of Engineer Officer Class-2 and Deck Officer Class-2, shall have 12 months' approved sea-service each as Engineering and Navigating Watch keeping Officer, total 24 months approved sea service, at ship of 3000 GWT or more and main engine propulsion power of 3000KW or more.
    - (c) Shall have completed any approved course in ship management, international maritime conventions and national maritime laws;
    - (d) Have medical fitness certificate and eye sight test certificate as per rule 25;
    - (e) Shall comply with other pre-requisites referred to in para-1 of appendix -3 and para-1 of appendix-4.
  - (2) **Marine Engineer Officer Class-2 and Deck Officer Class-2 Dual certificate of competency:** Any person shall have to comply with the following requirement for obtaining Marine Engineer Officer Class-2 and Deck Officer Class-2 dual Certificates of competency:

- (a) Shall have dual certificate of competency as Marine Engineer Officer Class-3 and Deck Officer Class-3;
  - (b) Shall have 12 months' sea-service each as Engineering and Navigating Watch keeping Officer, total 24 months approved sea service, at ship of 3000 GT or more and main engine propulsion power of 3000KW or more;
  - (c) Shall have completed any approved course in ship management, international maritime conventions and national maritime laws and practical training in following subjects:
    - i) Practical training in Command Navigation, ARPA, Radar and electronic navigation;
    - ii) Shall have completed and have certificate in approved medical care training as per rule 17(2).
  - (d) Shall have medical fitness certificate and eye sight test certificate as per rule 25;
  - (e) Shall comply with other prerequisites referred to in para-2 of appendix-3 and para-2 of appendix-4.
- (3) Marine Engineer officer class 3 and Deck officer class-3 dual certificate of competency:** Any person shall have to comply with the requirements referred to in para-3 of appendix-3 and para-3 of appendix 4 for dual certificate of competency as marine engineer officer class-3 and Deck officer class -3
- (4) Deck officer class 4 and Marine engineer officer class-4 dual certificate of competency:** Any person shall have to comply with the requirements referred to in para-4 of appendix-3 and para-4 of appendix 4 for dual certificate of competency as deck officer class-4 and marine engineer officer class -4
- (5) Deck officer class 5 and Marine engineer officer class-5 dual certificate of competency:** Any person shall have to comply with the requirements referred to in para-5 of appendix-3 and para-5 of appendix 4 for dual certificate of competency as deck officer class-5 and marine engineer officer class -5
- 3. Pre-requisites for obtaining Deck Rating and Engine Rating Dual Certificate of Competency:**
- (1) Navigation watch rating and Engine watch rating dual certificate of competency:** Any person shall have to comply with all the requirements referred to in rule 20 and rule 21 for Navigation watch rating and Engine watch rating dual certificate of competency.
  - (2) Able Seafarer Deck and Able Seafarer Engine dual certificate of competency:** Any person shall have to comply with all the requirements referred to in rule 20 and rule 21 for Able Seafarer Deck and Able Seafarer Engine dual certificate of competency.
- 4. Examinations for Dual Certificate of Competency:** (1) Department of shipping, from time to time, shall inform by notice to all concerned regarding place, date, time and rules of participating examination for obtaining dual certificate of competency. Candidate shall qualify separately in of Deck and Engineering subjects in the oral examination.

(2) Subjects of Examination:

(a) Deck Officer Class-1 and Marine Engineer Officer Class-1:

Serial No.	Subject:	Minimum pass marks (%)
1)	Orals	70

(b) Marine Engineer Officer Class-2 and Deck Officer Class-2 :

Serial No.	Subject:	Minimum pass marks (%)
1)	Applied Mechanics	50
2)	Applied Heat	50
3)	Electro-technology	50
4)	Machine Drawing	50
5)	Engineering Knowledge (General)	50
6)	Engineering Knowledge (Motor)	50
7)	Navigational Aids	60
8)	Meteorology	50
9)	Shipboard Operation	60
10)	Business & Law	50
11)	Ship Stability	60
12)	Navigation	70
13)	Ship Construction	60
14)	Signalling	80
15)	Orals	70

(c) Marine Engineer Officer Class-3 and Deck Officer Class-3 :

Serial No.	Subject:	Minimum pass marks (%)
1)	Applied Mechanics	50
2)	Applied Heat	50
3)	Electro-technology	50
4)	Engineering Knowledge (General)	50
5)	Engineering Knowledge (Motor)	50
6)	Cargo operations & Stability	60
7)	Ocean & Offshore Navigation	70
8)	Coastal Navigation	70
9)	Meteorology	50
10)	Principles of navigation	60
11)	General Ship Knowledge	60
12)	Signalling	80
13)	Orals	70

(d) Deck Officer Class-4 and Marine Engineer Officer Class-4:

Serial No.	Subject:	Minimum pass marks (%)
1)	Orals	70

(e) Deck Officer Class-5 and Marine Engineer Officer Class-5:

Serial No.	Subject:	Minimum pass marks (%)
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1)	Cargo operations & Stability	60
2)	Navigation	70
3)	Signalling	80
4)	Naval Architecture	50
5)	Machine Drawing	50
6)	Engineering Knowledge (General)	50
7)	Engineering Knowledge (Motor)	50
8)	Orals	70

(f) Navigation watch rating and Engineering watch rating:

Serial No.	Subject:	Minimum pass marks (%)
1)	Orals	70

(g) Able Seafarer Deck and Able Seafarer Engine:

Serial No.	Subject:	Minimum pass marks (%)
1)	Orals	70

(3) Exemption: as per rule 6 of these rules.

4. Syllabus for Dual certificate of competency: (1) Syllabus of the subjects referred to in appendix-2 shall apply to Deck Officer and Marine Engineer officer Dual certificate of competency.

(2) Syllabus for Deck Rating and Engine Rating Dual certificate of competency shall be as per the respective table of the STCW Code.

**Appendix -7**

**[vide rule 19(3)]**

**Pre-requisites for recruitment as Rating**

Serial No.	Various category rating	Required qualification
1.	(a) Carpenter	(a) S.S.C. and three years diploma from any recognised technical institute on related field :
	(b) Plumber	(b) Not less than 20 years of age.
	(c) Pump man	(c) Basic training as per rule 11(2).
	(d) Deck fitter	(d) Medical fitness as per rule 25
	(e) Diesel Mechanic	(e) Electro-Technical rating certificate for electrician
	(f) Reefer Mechanic	
	(g) Electrician	
	(h) Engine Fitter	
	(i) Fitter/Welder	
2.	(a) Lascar-3	(a) Not less than 16 years of age.
	(b) Fireman	(b) Basic training as per rule 11(2).
	(c) Steward-2	(c) Shall have pre-sea training certificate. (d) Medical fitness as per rule 25.
3.	Lascar-2 (navigation watch rating)	(a) Not less than 17 years of age.
		(b) 12 months approved sea service including at least 6 months experiences as lascar -3 in the deck department or 3 months sea service with approved deck rating pre-sea training.
		(c) Navigation watch rating certificate as per rule 20.
		(d) Medical fitness as per rule 25.
4.	Lascar-1 (Able Seafarer Deck)	(a) Not less than 19 years of age;
		(b) 12 months sea service after holding navigation watch rating certificate or 36 months sea service as GP rating including 18 months sea service in

- the deck department after holding navigation watch rating certificate;
5. Deck Sareng

    - (c) Proficiency in Survival Craft and Rescue Boat Certificate as per rule 15(1);
    - (d) Able Seafarer Deck certificate as per rule 20
    - (e) Medical fitness as per rule 25.
  6. Greaser-2(Engineering Watch Rating)

    - (a) Not less than 24 years of age;
    - (b) 48 months' sea service as lascar -1;
    - (c) Medical fitness as per rule 25.
  7. Greaser-1 (Able Seafarer Engine)

    - (a) Not less than 17 years of age;
    - (b) 12 months approved sea service including at least 6 months experience and training in the engine department or 3 months sea service with approved engine rating pre-sea training;
    - (c) Engineering Watch Rating Certificate as per rule 21;
    - (d) Medical fitness as per rule 25
  8. Greaser-1 (Able Seafarer Engine)

    - (a) Not less than 19 years of age;
    - (b) 12 months sea service after holding engineering watch rating certificate or 36 months sea service as GP rating including 18 months sea service in the engine department after holding engineering watch rating certificate;
    - (c) Proficiency in Survival Craft and Rescue Boat Certificate as per rule 15(1);
    - (d) Able Seafarer Engine certificate as per rule 21
    - (e) Medical fitness as per rule 25.
  9. Engine Sareng:

    - (a) Not less than 24 years of age;
    - (b) 48 months sea service as greaser -1;
    - (c) Medical fitness as per rule 25.
  9. Steward-1

    - (a) Not less than 18 years of age;
    - (b) 6 months experience as Steward -2;
    - (c) Medical fitness as per rule 25.

10. Chief Steward
- (a) Not less than 24 years of age;
  - (b) 48 months sea service as Steward -1;
  - (c) Medical fitness as per rule 25.
11. Second Cook
- (a) Not less than 19 years of age;
  - (b) Minimum S.S.C and trade certificate or diploma or training certificate in cooking from approved merchant marine training institute or Bangladesh Tourism Corporation or any recognised hotel.
  - (c) Shall have Ships Cook certificate
  - (d) Basic training as per rule 11(2).
  - (e) Medical fitness as per rule 25.
12. Chief Cook
- (a) Not less than 24 years of age;
  - (b) 48 months sea service as Second Cook;
  - (c) Medical fitness as per rule 25.

By order of the President

Md.Abdul Mannan Hawlader

Secretary

Ministry of Shipping