

Syllabus for MEO Class I Preparatory Course

Duration: Two months (8 weeks, 40 working days, 240 contact hours)

The Marine Engineer Officer (MEO) Class-I Preparatory Course shall be designed to prepare candidates for the Written and Oral Examinations leading to the award of the Marine Engineer Officer Class-I Certificate of Competency (CoC) in accordance with the requirements of Regulation III/2 and the relevant provisions of the STCW Convention, 1978, as amended, including the associated sections of the STCW Code.

The course shall be conducted as a fully offline programme over a duration of eight (8) weeks, comprising 40 working days and 240 contact hours.

The course shall comprise the following syllabus:

1. Knowledge of national maritime legislation, including the Indian Merchant Shipping Act, 2025, Rules framed thereunder; and, understanding of international maritime instruments such as treaties, conventions, protocols and codes, including their processes of formulation and adoption, with particular reference to the United Nations Convention on the Law of the Sea, 1982 (UNCLOS). Understanding of the role and functions of the International Maritime Organization (IMO), including knowledge of major IMO Conventions and instruments relating to maritime safety, prevention of marine pollution, liability and compensation regimes, and other associated maritime regulatory subjects.
2. Overview of Quality, Safety and Energy Management Systems in maritime organizations with reference to the International Safety Management Code (ISM Code) and ISO 9001:2008, including their interrelationship and application on board ships. Introduction to IMO guidelines on the ISM Code issued by the International Maritime Organization, and their linkage with ISO 14001, OH&S systems and ISO 50001. Principles of shipboard internal auditing, including types of audits, auditing techniques, audit reporting, identification of non-conformances and corrective/preventive actions. Overview of certification requirements for quality management and ISM systems including DOC and SMC, and introduction to the concepts of Total Quality Management (TQM) and continuous improvement in maritime organizations.

3. Overview of Classification Societies and their functions in ensuring the safety, structural integrity and seaworthiness of ships, including statutory certificates and documents under international conventions. Study of the role and duties of classification societies, principles of ship classification, and classification surveys including continuous surveys of machinery and hull, other survey methods, and enhanced special survey programmes. Procedures for assignment, maintenance, suspension and withdrawal of class. Role of Classification Societies as Recognized Organizations to flag administrations for statutory survey and certification of ships. Duty of care and responsibilities owed by Classification societies. RO Code and RO monitoring by maritime administrations. Ship inspections for first entry into the Indian flag with reference to the Merchant Shipping Act, 2025 and the Merchant Shipping (Registration of Indian Ships) Rules, 2026 relating to registration and compliance requirements. Introduction to open registry and its implications in international shipping.
4. Principles of ship stability including stability during dry docking, damage stability in cases of flooding or grounding, and countermeasures to maintain adequate stability. Overview of relevant requirements under the SOLAS Convention Chapter II-1 relating to subdivision, stability, trim and structural stress, and relevant provisions of the MARPOL Convention. Introduction to the International Code on Intact Stability 2008 (2008 IS Code) covering mandatory and recommended stability criteria for safe ship operation. Basic understanding of probabilistic damage stability assessment, including ship collision damage analysis and the treatment of variables such as ship speed, collision angle, type and displacement in stability evaluation.
5. Overview of Official Log Books, including their purpose, statutory significance and maintenance in accordance with the Merchant Shipping Act, 2025 and relevant rules. The Official Log Book serves as the formal record of a ship's voyages and significant events on board, acts as a communication link between the Master and the Administration, and is a legally admissible document in court proceedings. Emphasis is placed on legislative requirements for proper upkeep and accurate entries in compliance with statutory provisions.
6. Monitoring and control of compliance with legislative requirements relating to safety of life at sea and protection of the marine environment, including knowledge of conventions adopted by the International Maritime Organization. Statutory shipboard certificates and documents, their issuance and validity, and responsibilities under the International Convention on Load Lines, International Convention for the Safety of Life at Sea (SOLAS), and International Convention for the Prevention of Pollution from Ships (MARPOL), along with relevant national legislation such as the Merchant Shipping Act, 2025. Chief Engineer's role in tanker vetting and inspection programmes such as the Ship Inspection Report Programme (SIRE), Tanker Management and Self-Assessment (TMSA), and the RightShip Inspection Programme, together with marine environmental awareness and industry best practices recommended by International Chamber of Shipping, INTERTANKO, BIMCO, and Oil Companies International Marine Forum. Managerial oversight of BWMS commissioning testing and malfunction reporting.

7. Knowledge of ship security systems in accordance with the International Ship and Port Facility Security (ISPS) Code, including mandatory requirements and guidance contained in Part A and Part B under SOLAS Chapter XI-2, and coverage of piracy threats and anti-piracy measures, including existing and proposed counter-piracy practices and industry guidance.
8. Knowledge of the role of the World Health Organization in global public health, including monitoring disease outbreaks and health systems, and the provisions of the International Health Regulations (2005) relating to shipboard health documentation such as the Ship Sanitation Control Exemption Certificate and Ship Sanitation Control Certificate, which replaced the earlier Deratting / Deratting Exemption Certificates. The requirement for the Master to complete the Maritime Declaration of Health using the standard international form, reporting particulars such as the validity of Ship Sanitation Certificates and the number of passengers and crew, as well as awareness of WHO Guidelines for Drinking Water Quality. Role of the International Labour Organization with an overview of the MLC, 2006 requirements relating to the Maritime Labour Certificate, Declaration of Maritime Labour Compliance and defending the ill-treatment of seafarers in foreign ports with clear knowledge of Universal Declaration of Human Rights and International Covenant on Civil and Political Rights.
9. Knowledge of Port State Control as the inspection of foreign ships in national ports to verify compliance with international regulations relating to ship condition, equipment, manning, and operation. Updates on Port State Control directives, the concept, role, and duties of the Flag State in exercising regulatory control over ships registered under its flag, and responsibilities as outlined by the International Chamber of Shipping and the International Shipping Federation. Coverage shall also include participation in the IMO Member State Audit Scheme, commitments under regional Memoranda of Understanding (MoU), relevant instruments used by MoU authorities, inspection procedures, rectification and detention, appeal procedures and the importance of Detention review panels, provision of information by authorities, operational violations, and procedures for proposing and enforcing amendments to MoU provisions.
10. Knowledge of ship survey and certification requirements, including the principles of the Harmonized System of Survey and Certification (HSSC). Types of statutory surveys such as initial, annual, intermediate, periodical, renewal, non-periodical surveys, in-water surveys and additional surveys, their purpose and scope, general survey requirements, and the statutory certificates required to be carried on board ships under the harmonized system.
11. Knowledge of marine insurance including Hull and Machinery Insurance and the role and operation of Protection and Indemnity Clubs, covering principles of indemnity, mutuality, and third-party liabilities, and types of P&I covers such as cargo damage, collision, personal injury or death, pollution, wreck removal, crew repatriation, and stowaways. Charter party concepts

(time, voyage, and bareboat charter) and the Chief Engineer's role in compliance with charter party requirements, including fuel management, sampling, and machinery maintenance. Principles of marine insurance under the Marine Insurance Act 1906, general and particular average, and basic concepts of marine salvage under the International Convention on Salvage 1989 and the Lloyd's Standard Form of Salvage Agreement (LOF).

12. Knowledge of emergency preparedness and response for shipboard emergencies such as oil spill, fire, flooding, collision, grounding, and personnel accidents. Must cover emergency and damage control plans, vital damage control systems including communications, emergency power, pumping, fire main and drainage systems, and measures for effective response and drills. It shall include damage control strategies, emergency repairs, restoration of services, and coordination with authorities and owners. Accident case studies, root cause analysis, reporting procedures, and principles of risk assessment and risk management including ALARP in accordance with the International Safety Management (ISM) Code and industry best practices such as Tanker Management and Self-Assessment (TMSA). Also address detection, handling and restoration procedures for major machinery failures such as main engine bearing failure, turbocharger breakdown, boiler tube failure, lubricating oil contamination, and severe flooding of engine room bilges.
13. Study of human relations and modern management principles, including organizational behaviour and the influence of individual and group behaviour within organizations. The syllabus shall cover communication and information flow within organizations, conflict management, and the influence of human factors in shipboard systems. It shall include cross-cultural aspects of shipboard management, workload management, planning, coordination, delegation, prioritization, and effective resource management. Emphasis shall be placed on effective communication on board and ashore, leadership, motivation, assertiveness, decision-making techniques, situational awareness, and risk assessment. Coverage shall also include prevention of human error, corrective actions, development and implementation of standard operating procedures, and crisis management on board ships, including human behaviour during emergencies and the importance of drills. Psychological safety leadership, anti-harassment procedures and fatigue-risk management shall also be covered.
14. Study of training and instructional responsibilities of the Chief Engineer as a trainer for engine room personnel. The syllabus shall cover the skills required for effective training, including comprehension, conceptualization, creativity, and conduct, along with personal qualities such as confidence, communication ability, adaptability, and leadership. It shall include the training process comprising training needs analysis, design and development, and deployment of training. Emphasis shall also be placed on discipline on board, counselling, housekeeping, safety and

hygiene, mentoring and motivation through role modelling, and encouraging group participation and discussion for effective learning and team development.

15. Study of inventory management on board ships, including management of spares and stores, safety stock levels, and re-order planning using the Re-Order Point (ROP) concept, including lead time considerations. The syllabus shall also cover calculation and management of bunker fuel requirements, inventory control of fuel and lubricating oils, including the use of low BN cylinder oil for low sulphur fuels, and quality management of stored materials. Relevant case studies, including those from the Marine Accident Investigation Branch, shall also be discussed.
16. Study of Management Information Systems (MIS) in ship management, including computer system resources and computer-based information systems. The syllabus shall cover Decision Support Systems and Expert Systems, their role in problem solving and decision making, and the benefits of such systems in supporting operational and managerial functions. It shall also include types of Decision Support Systems such as knowledge-based systems, communication-driven DSS, data-driven DSS, document-driven DSS, and model-driven DSS. Oversight of MASS trials, remote operations, fundamentals of sensor technology, digital documentation & e-certification compliance.
17. Study of record management in the engine room, including preparation, maintenance, and interpretation of records relating to machinery operation and maintenance. The syllabus shall also cover the Chief Engineer's standing orders, night order book, updating of circulars, and maintenance of statutory records such as the Oil Record Book and other documentation required under the International Convention for the Prevention of Pollution from Ships (MARPOL).
18. Study of economising fuel consumption on board ships, including effective power balancing and propulsive characteristics of diesel engines in relation to speed, output and fuel consumption. Bunker management, use of low sulphur fuels and fuel change-over procedures, fuel quality requirements in accordance with the ISO 8217 marine fuel standard, and factors affecting vessel performance, including interpretation of engine load diagrams.
19. Study of budgeting and cost control in ship operations, including principles of cost value analysis for cost reduction and the classification of fixed and consumable costs. The syllabus shall cover voyage expenses such as bunker fuel, port charges, cargo handling costs, canal tolls, agency fees and commissions, as well as analysis of dry-docking and repair costs. It shall also include evaluation and contemporary methods in reduction of downtime; and, its impact on operational efficiency and expenditure.
20. Study of practical electricity and electronics including power electronics on board ships, including high voltage (HV) systems, their definition, applications, advantages, safety

requirements, busbar arrangements, insulation, short circuit effects and protection, generator and motor protection, and testing protocols such as insulation resistance measurement. Concepts of electrical propulsion including synchronous motor drives and Azipod propulsion systems, their construction, operation, advantages, limitations, maintenance requirements, and speed control using variable frequency methods such as Pulse Width Modulation. In addition, it shall include the use and application of circuit breakers in HV systems, particularly SF₆ and vacuum circuit breakers and their advantages in marine high voltage installations.

21. Study of recent developments in marine diesel engines and propulsion systems including dual fuel engines and contemporary technologies as may be adopted from time to time by eminent engine builders. Camshaft-less engines, electronic governors, common rail fuel injection systems, and control systems for electronically controlled engines. Recent developments in tribology such as advanced bearing lubrication techniques, alpha cylinder lubricator systems, fuel dilution in lubricating oils and methods of prevention, friction–speed characteristics in lubrication, and hydrodynamic lubrication of seals. In addition, developments in propulsion systems such as contra-rotating propellers, wake equalizing ducts, water jet propulsion, electrical propulsion, and PTO/PTI arrangements in modern propulsion systems. New innovations in supercharging systems, turbo chargers, turbo alternators and hybrid systems for improving overall plant efficiency. Additional management-level competence shall include supervisory responsibilities for alternative-fuel systems, including:

- integration of alternative-fuel risk assessments into the Safety Management System (SMS);
- oversight of bunkering operations for low-flashpoint and emerging fuels in accordance with applicable safety guidelines;
- evaluation of operational limits, safeguards, and fuel-system boundaries for safe machinery operation;
- incorporation of fuel-specific maintenance and inspection requirements into the Planned Maintenance System (PMS).

22. Study of greenhouse gas (GHG) emissions from ships, including statutory restrictions on EU waters; methods for monitoring, controlling, and reducing emissions in compliance with the latest IMO conventions. Understanding of carbon capture and carbon neutralization technologies, design and development of hull forms and optimization techniques to minimize wake and frictional resistance, propeller & rudder interaction; and, the application of new-generation low-friction, fouling-resistant, and environmentally compliant paints and coatings. Use of carbon-free and carbon-neutral fuels, along with emerging technologies for emission reduction, all in accordance with IMO regulations such as MARPOL Annex VI, the Energy Efficiency Existing Ship Index (EEXI), Carbon Intensity Indicator (CII), and the IMO Strategy for the reduction of GHG emissions from ships.

23. General understanding of Artificial Intelligence (AI) and its emerging applications in the maritime industry. The use of AI in ship navigation support systems, predictive maintenance of machinery, fuel efficiency optimization, voyage planning, autonomous shipping concepts, and data-driven decision-making in vessel operations and fleet management. Digitalization of maritime transport including the use of digital platforms, smart ships, integrated bridge systems, remote monitoring of machinery, electronic documentation, and the role of Internet of Things (IoT) in shipboard and port operations. Basic knowledge of blockchain technology and its application in shipping, including secure digital record-keeping, electronic bills of lading, cargo tracking, supply chain transparency, and improved coordination among shipowners, charterers, ports, and logistics stakeholders. Additional management-level competence in cyber-risk management under the ISM Code, including oversight of engineering-related cyber-risk controls, ensuring cyber-risk considerations are incorporated into the SMS, supporting internal audits on cyber-related systems and contributing to preparedness for cyber-incident response.
24. The study of Classic maritime casualties; Practices related to Casualty Investigations, related IMO guidelines and procedures.
25. Underwater noise; ship designs and operations to reduce such noise and allied areas.