



भारत सरकार / GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
MINISTRY OF PORTS, SHIPPING AND WATERWAYS

नौवहन महानिदेशालय, मुंबई
DIRECTORATE GENERAL OF SHIPPING, MUMBAI


DGS-Circular No. 24 of 2025

(STCW Circular No. 02 of 2025)

File No. 25-104/7/2025 – DGS		Comp. No.: 33029	Date: 21.05.2025
Authorized by Chief Examiner of Master and Mates	Subject: Revised Course Curriculum for Second Mate Foundation Course.		
<ol style="list-style-type: none">1. Maritime Safety and Training, Examination and Assessment of Seafarers are paramount to the Directorate General of Shipping (DGS), the competent authority of the Government of India for maritime affairs. The DGS periodically reviews the syllabi of competency courses to ensure that it is meeting the requirements of the shipping industry.2. A Syllabus Revision Committee was constituted by the Directorate vide N.T. Wing / EAC Branch Nautical Circular No. 17 of 2024 dated 02.07.2024 for the revision of syllabi for Nautical Competency Courses leading to Certificate of Competency (CoC) examinations.3. Upon extensive deliberations with the stakeholders by the said committee, the syllabus for the Second Mate Foundation Course has been reviewed and revised. The updated syllabus incorporates relevant sections of IMO Model Course 7.03 : Officer in charge of a Navigation Watch.4. Based on the recommendations of the committee, the revised course syllabus, course duration, and instructional hours have been finalized. These are enclosed as:<ol style="list-style-type: none">a. Annexure 1 – Revised Syllabusb. Annexure 2 – Standard Format for Certificate of Course Completionc. Annexure 3 – List of Library Books, Publications, and Reference Materials5. It is expected that all approved maritime training institutes will adhere to these guidelines in letter and spirit.			

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6. The revised guidelines for Second Mate Foundation Course shall come into effect for all batches commencing from May 2025 onwards. Henceforth, the Second Mate Foundation Course shall commence on the 15th day of each month, or the following working day, as prescribed in the Annual Schedule of Courses and Examinations published on the DGS website.
7. This is issued with the approval of the Chief Examiner of Masters and Mates.



(Capt. Ravi Singh Sikarwar)
Nautical Surveyor-cum-DDG(Tech.)

To,

1. DGS Secretariat.
2. Chief Surveyor with the Govt. of India
3. Nautical Advisor to the Govt. of India
4. All Maritime Training Institutes
4. INSA/FOSMA/MASSA/ICCSA
5. Computer Cell

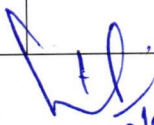
९वीं मंज़िल, बीटा बिल्डिंग, आई थिंक टेक्नो कैम्पस, कांजुर गाँव रोड, कांजुरमार्ग (पूर्व) मुंबई- 400042

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ANNEXURE 1**SECOND MATE FOUNDATION COURSE
DETAILED SYLLABUS****DURATION: 2 MONTHS****TOTAL HOURS: 256****PAPER 1 – NAUTICAL MATHEMATICS (60 Hours)**

Sr. No.	TOPICS	Hours
A	BASIC MATHEMATICS	
1	Algebra, Graphs, Proportion, variation and interpolation, Geometry, Trigonometry, Mensuration, Vectors & Statistics. a) Linear interpolation. To interpolate quickly and accurately and perform inverse interpolation. b) Calculation of areas and volumes of regular shapes – rectangle, triangle, circle. Calculation of centroids of areas and volumes of regular shapes and their combinations.	15
B	CALCULUS	
1	Differentiation: The formulae for the derivations of algebraic, trigonometric, inverse, exponential and logarithmic functions (to be assumed) and their applications in examples. Derivation of second order.	10
2	Integration: Integration as a reverse process of differentiation. Standard forms. Integration by substitution. Integration by parts. Partial fractions.	10
C	CO-ORDINATE GEOMETRY	
1	Circle: Standard and general equations.	4
2	Conics: Standard forms of equations of parabola, hyperbola and ellipse (to be assumed). Focus directrix property. Symmetry of these curves about their axis and centre. Properties of conics for application to navigation.	6
D	SPHERICAL TRIGONOMETRY	
1	Properties of a spherical triangle, Polar triangle and their applications. Solution of spherical triangles by cosine formula, sine formula and Napier's Rules for right angled spherical triangles and quadrantal triangles.	15


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PAPER 2 - NAUTICAL PHYSICS (60 HOURS)		
A	BASIC PHYSICS	
1	Mass, weight and force, Distance, velocity and acceleration, Circular motion and rotation, Statics, Work, energy and power, Machines, Density, Fluids, Principle of Archimedes and flotation	15
B	MECHANICS	
1	Newton's law of universal gravitation: Variations in 'g' due to rotation of the earth and due to latitude and elevation.	7
2	Rotation: Moment of inertia and radius of gyration. Precession. The top and the gyroscope. Stability with rotation.	8
C	HEAT	
1	Expansion: Coefficient of real expansion of fresh water and sea water. Anomalous expansion of water. Change of state: Melting point of ice and factors affecting melting point. Boiling point of water and effects of pressure and impurities. Effects of high latent heat of water.	6
2	Transference of heat: Theory of conduction, convection and radiation. Entropy and enthalpy.	6
D	SOUND	
1	Velocity of sound in water: Effects of pressure, temperature and salinity on velocity of sound in water. Determination of velocity of sound in sea water.	6
2	Characteristics of sound: Intensity and loudness. Decibel. Siren. Pitch and frequency. Doppler effect.	6
E	MAGNETISM	
1	Magnetic field. Field round a bar magnet. Laws of magnetism: like poles repel; unlike poles attract. Field around two bar magnets with like poles towards each other and unlike poles towards each other. Earth's magnetic field.	6
PAPER 3 - NAUTICAL CHEMISTRY (60 HOURS)		
A	PHYSICAL CHEMISTRY	
1	Structure of the atom, molecules, chemical bond and formation of compounds: Protons, electrons and neutrons, atomic number, electronic configurations of atoms, atomic mass and isotopes, definition of valency, the electrovalent bond, the covalent bond and the coordinate bond.	5

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2	The periodic table, atomic behaviour and atomic structure. The periodic law and its relationship to the electronic structure of the atoms; properties of atoms.	5
3	Physical properties of chemicals: Appearance, odour, Melting point, Boiling point, Effect of pressure on melting and boiling point, relation between molecular weight and boiling point, Vapour pressure, Lower and upper flammable limits, Relation between boiling point, vapour pressure and flammability, Effervescence, Solubility, Flash point, closed cup method for determining Flash point, auto ignition temperature, Pour point, Viscosity, volatile and non-volatile cargoes.	6
4	Properties of gases: Gas laws	1
5	Adiabatic and Isothermal expansion of gases	1
6	Explanation of Mollier diagram	1
7	Change of state	1
8	Vapours	1
9	Electro chemistry: Construction and chemical reaction in storage batteries/cells used on ships.	1
10	Relevance of gas laws to LPG carriers and Reefer Ships	1
11	Principal uses of selected chemicals	1
12	Compatibility between normal chemicals carried on board	1
13	Cargo containment: materials and coating	1
14	Health hazards/ Biochemical aspects of some of the cargo carried toxicity, corrosivity.	1
15	Chemical corrosion on ships	1
16	Tank cleaning on ships	1
C	INORGANIC CHEMISTRY	
1	Matter and its properties: Solids, liquids and gases; Elements and compound and Mixtures; Law of indestructibility of matter.	2
2	Chemical reactions and products: Physical change, chemical change, information conveyed by equations, evolution and absorption of energy in chemical reactions- endothermic and exothermic reactions.	3

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3	Types of chemical reactions: displacement reactions, decomposition reaction, double decomposition reactions, polymerization, role of catalyst, role of inhibitors.	3
4	Metals and non-metals: Properties of metals and non-metals, preparation of non-metals and metallurgy.	2
5	Chemistry of Groups 0-VIII: General features and applications.	1
6	Hazards of Inorganic cargoes carried on board vessels with respect to Flammability, Toxicity, Reactivity and Solubility.	2
7	Extraction and manufacturing processes of Iron, Copper and Aluminium etc.	1
8	Manufacturing process of stainless steel, cast and forged iron/steel.	1
9	Environmental Chemistry	1
D	ORGANIC CHEMISTRY	
1	Nomenclature, Empirical formula, Molecular formula & molecular weight.	3
2	Sources and uses of organic compounds: Recovery of benzene, toluene, naphtha, phenol, etc. from coal, cellulose derivatives from plants, starch derivatives and petroleum derivatives including LPG	4
3	Properties & applications of: <ul style="list-style-type: none"> ➤ Alkanes: Methane, Butane, Propane, n-butane, iso-butane, n-pentane, iso-pentane, n-hexane. ➤ Alkenes: Ethene, propylene, butylene, pentylene, hexylene. ➤ Alkynes: Ethyne, propyne, butyne ➤ Halogenated hydrocarbons: Methyliodide, ethyliodide, propyliodide. ➤ Alcohol's & phenols: Methyl alcohol, ethyl alcohol, ethylene glycol, glycerol. ➤ Aldehydes: Formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, Acetone, ethyl methyl ketone. ➤ 	4
4	Associated Hazards of above cargoes with respect to Flammability, Toxicity, Reactivity and Solubility.	3
5	Isolation of Aliphatic Hydrocarbons from Petroleum (Refining process)	1
PAPER 4 - NAUTICAL ELECTRICITY AND ELECTRONICS (60 HOURS)		
A	ELECTRICITY	
1	Definitions & relationship between electric current, EMF, power and energy.	2
2	Ohm's law, concept of resistance, simple circuits (series and parallel). Effect of temperature on conductors, insulators and semi-conductors.	2
3	Kirchoff's laws and its applications	2

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4	Properties of electric current – Heating effect. Magnetism and Magnetic effect with special reference to straight conductor, parallel conductors, coil and solenoid.	5
5	Concept of Inductance – Self/Mutual: - Definitions, formulae related to Self/Mutual inductance, series and parallel combinations of inductors. Formula of energy stored in inductor.	4
6	Concept of capacitance. Capacitance between two parallel plates. Series and parallel combination. Formula for energy stored in a capacitor. DC supply: Acid Battery/Alkali Battery construction and working. DC generator: Principle, construction and working. AC supply: Definition of sinusoidal supply, frequency, peak, RMS value. AC generator: Principle, construction and working. Transformer: Principle, construction, working	6
7	Measurement of electrical quantities: Galvanometer (moving coil and moving iron), construction, principle and working, Conversion of a galvanometer into ammeter/voltmeter. Safety & Control: Switches, fuses, relays, electric bell, buzzer, motor starters, navigation lights.	5
8	Passive components	1
B	RADIO & ELECTRONICS	
1	Electron Emission: Thermionic, field, photo & secondary	2
2	Semiconductors: Doping, P and N type, PN, PNP & NPN semiconductor devices. α and β current gains and relationship between them.	3
3	Use of PN diodes in rectification. (Half wave rectifier, Full wave rectifier, Bridge rectifier).	2
4	Use of filter circuits in power supply. Use of capacitors, inductors in filter circuits.	1
5	Amplification: Use of transistors in amplifier circuits. CE mode, CB mode, CC mode.	2
6	Oscillator: LC tank circuit, use of transistors in oscillator circuits. Piezo electric effect and use of crystal in frequency control. Modulation circuits (AM and FM). PN diode in AM demodulation circuit.	4
7	Working of a transmitter with block diagram.	1
8	Working of receiver with block diagram.	1
9	Antenna: Straight, loop, Yagi.	1
10	Electro- Magnetic waves, Ionosphere, Ground waves, Sky waves	1

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11	Sensors and Transducers for temperature, pressure, level, flow, speed etc. CRT: Construction & application in visual display.	3
12	Raster screens and their application to ship's Radar.	1
13	Integrated circuits, Photoelectric devices, Digital circuits	2
14	Computer applications: Overview of the different parts of a desktop and laptop computer. Use of word processing software like Microsoft Word. Practical report writing, using email software, composing official emails. Using spreadsheets like Microsoft Excel to create data reports. Using PDF (portable documents format) documents to comment and write notes.	9

	Gender Sensitization	6
	Internal Assessment for all the 4 subjects and Feedback	10

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Certificate No. _____

Name of the Institution _____

Full postal address _____

Phone, Fax, _____

E-mail Address _____

THIS IS TO CERTIFY THAT _____

Date of Birth _____

Indian National Database of Seafarers (INDoS No.) _____

has successfully completed a training course held from _____ to _____ for :

Foundation Course (PCME) for 2nd Mate (F.G.)

The Course is approved by the Directorate General of Shipping for part fulfilments of the requirements laid down in IMO Model course 7.03, Regulation II/1 & II/3 and Table A-II/1 & A-II/3 of the STCW Convention, 1978, as amended.

The Candidate has also met the additional criterion specified in the STCW Convention specific to the issue of the Certificate.

This certificate is issued under the authority of the Directorate General of Shipping, Ministry of Ports, Shipping and Waterways, Government of India.

Date of Issue : _____

Date of Expiry : NA

Signature of Candidate

Name and Signature of Course In-charge

Name and Signature of Dean / Principal

The candidate has also successfully completed gender sensitization training during this course

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LIBRARY BOOKS, PUBLICATIONS, ETC. TO INCLUDE:

1. IMO Model Course 7.03, as amended
2. DGS Orders, Circulars and MS Notices
3. Training and Assessment programme (TAP) published by DG Shipping
4. Training Examination and Assessment Programme (TEAP) published by DG Shipping
5. Higher Engineering Mathematics by B.S.Grewal
6. Differentiation and Integration scheme series by Frank Ayres
7. Coordinate Geometry by Lalji Prasad
8. Theory of Gyroscopic Effects for Rotating Objects by Ryspek Usubamatov
9. Rotational Mechanics by Dr. Sanjay Kumar
10. A Text book of Physics of sound by Manas Kumar Sahu
11. Heat Thermodynamics and Statistical Physics by Brij Lal, Dr N. Subrahmanyam and P.S.Hemne
12. Physics for Higher School
13. Gravitation by Jwala Singh
14. Nautical Chemistry for Deck Officers by Capt.C.L.Dubey & Ms. Jitixa Modi
15. Principles of Physical Chemistry by Puri, Sharma Pathania
16. Concepts of Physical Chemistry by P. Bahadur
17. Understanding Physical Chemistry by Hrishikesh Chatterjee (Vol-I and Vol-II)
18. Numerical Problems in Physical Chemistry by Amalendu Ghoshal
19. Basic Inorganic Chemistry by Ajai Kuar
20. Advanced Inorganic Chemistry by S.K.Agerwal and Keemti Lal
21. Modern Organic Chemistry by M.K.Jain and S.C.Sharma


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