



सत्यमेव जयते

भारत सरकार/ GOVERNMENT OF INDIA

पोत परिवहन मंत्रालय / MINISTRY OF SHIPPING

नौवहन महानिदेशालय / DIRECTORATE GENERAL OF SHIPPING

“बिटा बिल्डिंग” 9 वी मंजिल / “BETA BUILDING”, 9th FLOOR

आई पसकैम् नोटेक् थिंक- / I-THINK TECHNO CAMPUS

कांजुर गाँव रोड / KANJUR VILLAGE ROAD

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NT/EXAM CIRCULAR NO. 01 of 2019

17 JAN 2019

Authorized by	Examination, Assessment & Certification (EAC) Branch	IS/ISO Clause No. 7.5.1
Chief Examiner of Master and Mates	<u>Subject: Requirements for certificate of Competency as Extra Master- reg.</u>	NT Exam Circular No. 01 of 2019
	File No: 7-NT(13)/2009-PT.	Date : 16.01.2019

The requirement for certifications of “Extra Master” is specified at Rule 23 of Merchant Shipping (Standards of Training, Certification and Watch keeping) Rules 2014. The detailed provisions under the said Rule are elaborated under section II/4 of the approved Training, Examination, And Assessment Programme (TEAP) Part –A [i.e. TEAP Part A; Rev.1; 1st May, 2015].

2. In view of the changes in maritime sector and to keep abreast of evolving technology and modern management techniques, the Extra Master course content has been revised and the existing section II/4 of TEAP Part A has been replaced as specified under **Annexure – A** to this circular which includes revised syllabus as **Annexure –B**.

3. This is issued with approval of Competent Authority.

(Capt. P.C. Meena)

Nautical Surveyor-cum-DDG [Tech.]

Section II/4 of TEAP Part –A

Ref: M.S.(STCW) Rules 2014

Rule 23 : Extra Master

1. Every candidate for certification as Extra Master shall hold a certificate of competency as Master (Master of a foreign going ship) on ships of 3000 gross tonnage or more (Ref. Section II/3).
2. The approved education, training, and examination as required by rule 23(2) (b) of Chapter II of M.S(STCW) Rules 2014 is the Extra Master's course, which consists of four parts, namely:

Part – A

Code	Name of Modules	Marks
EM101	Leadership, Management and Human Resources	200
EM102	Maritime Economics and Finance	200
EM103	Maritime Law	200
Total		600

Part – B

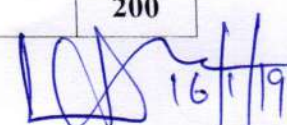
Code	Name of Modules	Marks
EM201	Advanced Navigation and Maritime Cyber Security	200
EM202	Advanced Naval Architecture	200
EM203	Commercial Engineering, Robotics and Alternate energy	200
Total		600

Part – C

Code	Name of Modules	Marks
EM301	Marine Environment and Ocean Governance	200
EM302	Port Management	200
EM303	Commercial Shipping Management	200
Total		600

Part – D

Code	Dissertation	Marks
EM401	Dissertation on any Marine topic using appropriate research methodologies. (12000 to 14000 words including Executive Summary)	200
Total		200



3. Details of the approved Extra Master's course syllabus is given in **Annexure -B** to this Circular.
4. Assessment for the Extra Master certificate will be held as follows:
 - a. Satisfactory completion of an approved written examination for each part/subject.
 - b. Satisfactory completion of a dissertation on a related maritime topic.
5. Part 'A', 'B', 'C' of the examination for an Extra Master certificate may be attempted together or separately and pass in any subject will be valid for all time.
6. Every candidate who completes the requirement of this circular to the satisfaction of the Chief examiner of Master and Mates will be issued an Extra Master certificate of competency. This will be issued in addition to the certificate of competency as Master on ships of 3000 gross tonnage or more as per regulation II/2 of STCW Convention and section A-II/2 of the STCW Code, held by the candidate.



Section II/4 of TEAP Part –A

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Part – B

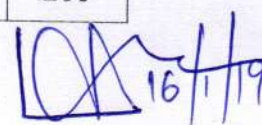
Code	Name of Modules	Marks
EM201	Advanced Navigation and Maritime Cyber Security	200
EM202	Advanced Naval Architecture	200
EM203	Commercial Engineering, Robotics and Alternate energy	200
Total		600

Part – C

Code	Name of Modules	Marks
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EM302	Port Management	200
EM303	Commercial Shipping Management	200
Total		600

Part – D

Code	Dissertation	Marks
EM401	Dissertation on any Marine topic using appropriate research methodologies. (12000 to 14000 words including Executive Summary)	200
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EM301	Marine Environment and Ocean Governance	200
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Total		600

Part – D

Code	Dissertation	Marks
EM401	Dissertation on any Marine topic using appropriate research methodologies. (12000 to 14000 words including Executive Summary)	200
Total		200

Note –

1. Each paper will be of 3 hrs duration with Maximum/Pass Marks – 200/100.
2. Guide for dissertation is recommended but is not mandatory. However, topic of dissertation needs to be from the maritime domain and is required to be approved by the Chief Examiner of Master and Mates.



LEADERSHIP

1. **Introduction to leadership:**

Distinguishing leadership functions (vis-à-vis leading, leader) concept of leadership (vision, mission, policies), key leadership theories (contingency theories, path goal theory, leader-member exchange theory, etc.); key leadership models (transformational, transactional and instrumental) individual factors and situational leadership and factors; management as a subset of leadership;

2. **Approaches to defining leadership:**

(trait, behavioural approach, skills approach) individual attributes of leadership; integral leadership, styles of leadership (charismatic, visionary, autocratic, entrepreneurial, contingency leadership etc), meaning and significance of contemporary leadership, how our values influence others; key leadership behaviours;

3. **Miscellaneous aspects of leadership:**

Ethical leadership and dark side of leadership; leaders role in crisis preparation and mitigation; emerging trends in leadership; global and Indian leaders;

MANAGEMENT

1. **Introduction to organisation and management:**

What is organization? Types of organisations, organisation design and behaviour, management function in organisation, shipping industry summary and types of organisation in it;

2. **Essentials of management functions:**

Definition and introduction to management and managerial functions (planning, organizing, controlling, decision making); project, program and portfolio management; communication management; time management; delegation & resource management; motivation methods; team management; vendor management, change management, process management; quality management & tools (ishikawa, pareto chart, histogram, scatter diagram, etc), cost management (EVM: earned value management); risk and issue management; contract management;

3. **Financial management:**

Definition and purpose of financial management; types of estimation process (PERT software, WBS method, use-case point method, 3-point estimation, wideband delphi technique); allotment of funds and capital structure; types of source of funds; procurement of funds; utilization of funds; accounting concepts on profit and loss; management practice, types of reserve, management of liquidity, financial control methods and tools;

4. **Operations management:**

Definition and purpose of operations management, finance, operation (planning, organising, directing and controlling of all activities in organisation), strategy, design of product, forecasting methods, supply chain configuration, quality assessment and quality control;

5. **Marketing management:**

Definition and purpose of marketing; five marketing concepts (production concept, product concept, selling concept, marketing concept, difference between marketing and sales function), marketing functions (market research, product development and management, promotion of product or service, sales and distribution, storage, standardization and testing, after sales and customer service, financing, market risk taking, market information), popular marketing methods and principles;

6. **Sales management:**

Definition and purpose of sales management, goal setting and planning of resource, designing sales strategy, different sales approach, sales analysis and reporting, sales team structure;

7. **Strategic management:**

Nature and scope of strategic management (strategic intent, vision, mission, objectives and policies, risk and rewards); process of strategic planning and implementation (environmental analysis and internal analysis, SWOT analysis); tools and techniques for strategic analysis (impact matrix: the experience curve, BCG matrix, GEC mode); concept of value chain; strategic profile of organizations; analysing competition; growth strategies (expansion, integration and diversification); concept of core competence, strategic flexibility; strategic alliances, mergers and acquisitions;

8. **Entrepreneurship concepts:**

Definition and purpose of entrepreneur, types of entrepreneur, functions of entrepreneur, entrepreneurial process, idea generation, value creation, creation of organisation;

9. **Information technology management:**

Definition and purpose of information technology management, basic concepts of IT (ITIL, ITSM concepts, ISO 27001 information security management); types of software licenses; basics of IT infrastructure and network management; software development lifecycles (introduction to Agile, Devops, Waterfall) some maritime specific software (e.g. JOT, JIBE, SHIPMATE, etc), enterprise resource planning (ERP); trends in information technology; managing and organising data resources

HUMAN RESOURCES

1. **Definitions, objectives and responsibilities :**

Functions and objectives of human resource management, personnel policies and principles; internal and external factors affecting HRM; principle of management and organisational behaviour (individual behaviour in organisation; group behaviour in organisation);

2. **HR responsibilities and role :**

Competitive challenges influencing HR; meeting competitive challenges; business models & strategies; strategic formation & implementation; meeting competitive challenges via HRM practices; management of human resources; sociology of organisations; theory and design; business communication; learning and development; reward management; business research and statistical techniques; employees' welfare and benefits administration; organisational behaviour; labour economics; industrial relations; employee counselling; conflict management and negotiation skills; organisational development and changes;

3. **Legal issues in HR:**

International legal systems & equal opportunities; employment laws; types of discrimination; legal issue related to harassment & employee safety; work flow analysis & organizational structure; job analysis; job design; employee benefits (historical trends & mandated programs, non-mandated programs); collective bargaining & labour unions (goals, structure & trends; legal framework & organizing process;)

4. **Compensation:**

Developing pay levels (external equity & market surveys; internal equity & job evaluation; current challenges); employee pay (merit systems & incentive plans; organizational & group plans; managerial pay & strategic fit)

5. **Planning and Selection:**

Manpower forecasting (steps in forecasting, demand forecasting techniques, forecasting accuracy); goal setting; manpower planning & resourcing (factors affecting manpower planning, 5 steps in manpower planning, controlling manpower costs); competency based management; recruiting; standards for selection methods; interviews, application blanks, & references; tests & personality inventories;

6. **Employee development & retention:**

Career & development planning; approaches to employee career development; mentoring, coaching, training (designing training programs, cross-cultural & diversity training and socialization programs), succession planning; measuring performance; employee turnover (introduction, causes & remedies, cost of employee turnover, importance of employee turnover); managing involuntary turnover; managing voluntary turnover; measuring & monitoring job satisfaction; employee exit process, managing redundancy;

7. **Stress management:**

Nature of stress; occupational stressors; stress and thought process; stress & personality (behavioral & situational modifiers); verbal and non-verbal indicators of stress; assessment of stress; stress and conflict; stress and motivation; decision making under stress; burnout; stress and social support;

8. **Conflict management:**

Definition, models of conflict (process & structural), sources of conflict, relationship between conflict & performance in team; individual differences, personalities & abilities, interpersonal conflict, group conflict, organizational conflict, dealing with difficult subordinates & boss, technique to resolve team conflict, strategies to resolve organizational conflict,

9. **Challenges of HRM:**

Major challenges; balancing work with life; attitudes towards unions; changing demographics of work force; changing employee expectations; globalization; motivation (concepts of motivation – early theories, contemporary theories, content theories, process theories); ethical issues in HR; managing ethics; resolving ethical issues; difficulties in decision making; international human resource management, managing diversity & strategic contexts;

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1. **Economic concepts:**

Basic concepts, principles and terminologies; theories of economic growth (growth across time, growth in different countries, accounting for growth), economic calculation, capital and rental cost, profit, scale and substitution, production function and aggregation; factors of production, utility and price, opportunity cost, price mechanism and the relationship between demand, price and quantity; competitive models and demand factors; Keynesian model vs classical models; economies of scale; interpret economic data;

2. **Macroeconomics, microeconomics and information economics :**

Macroeconomics (introduction to macroeconomics, basic macroeconomic equation system, fiscal policy, macroeconomic policy challenges, theoretical controversies, as an endogenous variables - investment, trade balance, real exchange rate, real interest rate); microeconomics (introduction to markets, consumers and utility, relative prices, demand elasticity and leisure, borrowing, lending, human capital, producers and profit maximization, efficiency, supply and demand, markets clearing, gains from trade, tariffs and quotas, monopoly, public goods, some classic policy issues, money vs barter); information economics (moore's law, moore's law and economic growth, asymptotically free goods, network effects, asymmetric information);

3. **International trade, exchange rates and balance of payments :**

International trade (basic trade and mechanisms; international trade theories; product cycle and strategic trade theories; comparative advantage; terms of trade and offer curve; different forms of trade; reasons for international trade; benefits of international trade; commodities in world trade; free trade v/s protected trade, WTO;); Exchange rates and balance of payments (how exchange rates are determined; free-floating and regulated markets; relationship between exchange rates and the factors affecting their fluctuations and a country's balance of payments; components of a balance of payments with particular reference to shipping; effect of exchange rate fluctuations on shipping; the modes of payment & receipts in shipping; role of different stake holders; role of different currencies balance of trade and balance of payments);

4. **Maritime economics :**

Linkage between economy, trade and shipping; organization of shipping market, 4 shipping markets, shipping market cycles (trough, recovery, peak/plateau and collapse), supply, demand and freight rates, costs, revenue and cash-flow, risk, returns and shipping company economics, economics of ship building and scrapping, demand & supply in shipping; economics of manning (factors influencing manning costs, controlling manning costs); fuel economics & bunker management: (different aspects of fuel management viz. technical aspects, operational aspects, purchasing aspects and chartering aspects); economics of scrapping and laying-up of ships (circumstances & decision of ship-owner; options, influencing factors, etc); economics of claims & damage compensation (collision, pollution, accidents, wreck- removal etc.); e-business (e-commerce, importance & limitation in shipping business, financial risk management, investment management, procurement & sales of vessels).

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5. **Shipping costs, revenue and operational economics :**

Classification of costs; cost structure in shipping; cost evaluation of different charters/voyages; choice of appropriate runs in cost effectiveness for different ships; responsibilities/sharing of cost by ship-owner & charterer; revenue analysis; different types of charter hire, economics of tramping and liner shipping; conferences and conference rate making; economics of time charter & voyage charter; final Accounts: process of preparing final accounts; Statement of facts; concepts of freight surcharge, CAF, BAF etc.

FINANCE

1. **Management accounting :**

Basic Accounting concepts, accounting principles; accounting process and procedures, evaluation of assets, liabilities, depreciation, investments, bad debts, accruals, prepayments, capital account, profit & loss statements, trial balance, balance sheet, stock, obsolete stock / scrap, costing, bad debts, preparation of financial statements with special reference to analysis of a balance sheet and measurement of business income, inventory valuation and depreciation, financial statement analysis, fund flow analysis, the statement of cash flows;

2. **Cost accounting :**

Records and processes, cost ledger and control accounts, reconciliation and integration between financial and cost accounts; overhead cost and control, job and process costing, budget and budgetary control, performance budgeting, zero-base budgeting, relevant costing and costing for decision-making, standard costing and variance analysis, marginal costing and absorption costing

3. **Financial management :**

Financing of companies; shares; debentures and other methods of raising capital; cost of capital; optimum capital structure; working capital; kinds of working capital; working capital management; time value of money; risk and return; capital budgeting; analysis of risk and uncertainty in capital budgeting; capital structure theories; profitability aspect; liquidity aspect; long term sources of finance (equity, term loans, debentures, bonds, securitisation, hybrid finance instruments, venture capital, lease finance and hire purchase); principles of public offerings and initial public offerings (IPO); valuation of bonds and shares; management of cash, receivables, inventory and current liabilities;

4. **Trading finance :**

Types of Transactions (bills of exchange, letters of credit, bill of sale, etc.); Type of cost (fixed, variable, direct, indirect, etc); principal characteristics of the main international stock exchanges on which shipping equity is traditionally listed, including the New York Stock Exchange, the Oslo Bourse and NASDAQ; implications of the US Sarbanes-Oxley Act 2002 for shipping companies looking to list on US stock exchanges;



5. **International finance :**

Institutional structure of international finance; history of exchange rate regimes (classical gold standard system, Bretton woods, post-Bretton woods era; different exchange rate regimes; monetary unions; balance of payment and foreign exchange market; exchange rate theories; exchange rate models with uncertainty; international capital flow and financial crisis;

6. **Significance of debt-equity structure for shipping company:**

The history, purposes, and composition of the main international body concerned with the setting of capital adequacy ratios for banks; the Basel Committee; the effects of the Basel regulations on shipping finance including the significance of the capital adequacy ratio; the basic composition of the Basel capital adequacy ratio in terms of tiers and asset weighting;

7. **Financial management for shipping :**

Historical context of ship finance (over the past four decades) and the significance of wider economic phenomena in shipping finance business; methods of financing ship purchase and fleet renewal; historical reasons why it has been difficult to attract external equity financing into the shipping business (volatility of the sector, secretiveness of ship-owners, single ship company, international jurisdictional and enforcing issues of court orders); principal sources of security for ships to lenders; valuation of ships; negotiating working capital loans from banks; mortgage of ships and terms of payment; cash flow forecasting; discounted cash flows for investment appraisal; elements of management accounting; general idea of corporate taxation; foreign currency transactions, advantages & disadvantages of currency & freight hedging, disbursements, daily running costs, bunker costs, etc. freight and hire-calculation & collection etc.;

8. **Lender's perspective in ship financing :**

Proper evaluation of asset to be financed, cash flow to be generated; significance of 'name' or 'reputation'; ship mortgages, and their importance as a source of bank security; legal rights of mortgagees in the event of default by borrower; assignment of insurances and earnings as sources of banker's security in a loan agreement; charges or liens over shares; guarantees from parent companies in respect of loans made to subsidiary companies; standard terms in the documentation of a guarantee provided by parent company in respect of loan made to its subsidiary; value of maintenance clauses in ship finance loan agreements; 'banks' and lenders' credit risk analysis of borrowers (6 'C' of credit risk analysis); characteristics and structure of special purpose companies;

9. **Debt financing and Bond markets:**

Differences between debt and equity financing (payment of mandatory interest versus payment of discretionary dividends); different forms of bonds and significance of different payment schedules; basic features of convertible bond issues; structure and purposes of convertible bonds; attractions and implications of conversion of convertible bonds from the issuer's (i.e. ship-owner) and investor's perspectives; significance of phases of the shipping cycle for the timing of issuance of convertible bonds; predicting the likelihood or otherwise of an investor to convert from debt into equity; principal consequence of conversion of a convertible; prohibition of reconversion from equity back into debt; functions and characteristics of sinking funds; use of high yield bonds in shipping finance.

10. **Securitization:**

Basic objective of securitization and the objectives of ship-owners in securitisation; bundling together of homogenous cash flows and their use as collateral for bond issue; basic structure of a securitisation, and the role of all participants; procedural steps in a securitisation;

11. **Types of loans used in shipping finance:**

Characteristics of the different types of loans used in shipping finance (plain vanilla loans, moratorium loans, bullet repayment loans, balloon repayment loans, back/front-ended loans, revolving credit facility loans); rationale for syndicating a loan, and the principal responsibilities of all parties to bond syndications; the structure and use of mezzanine finance and its suitability in shipping-finance;

12. **Alternative sources of ship finance:**

Principles and characteristics of shipyard credit as a source of finance; principles, structure and purpose of government subsidies; role and importance of export credit agencies in ship finance; the principles, structure and use of leasing-finance and operating; off-balance sheet finance; capital lease structure finance; advantages & disadvantages of Kg (German) Ship Financing and Ks (Norwegian) ship finance; Islamic finance in shipping (basic principles, characteristics of Shariah-compliant financial instruments found in shipping finance, including Mudharabah, Murabaha, Ijara, and Sukuk); new finance products such as baby bonds;

10/16/19

EM103 : MARITIME LAW

1. Overview of different types of Constitutions & Legal systems of the world (common law jurisdictions, civil law jurisdictions, etc.)
2. Overview of civil law and commercial law and Civil Procedures Code.
 - 2.1 Law of Contract: Contract Act 1872; General principles/essential features/types of contract, What is Contract, Proposal, Acceptance, Consideration, Privity of contract, Agreement, Capacity to contract, Free consent, Object & consideration, Void agreements, Performance of contract, Remedies for breach of contract, Quasi contracts.
 - 2.1.1 Contract of Indemnity: Characteristics; Rights of Indemnity-holder.
 - 2.1.2 Contract of Guarantee: Essentials of Contract of Guarantee; Distinction between Contract of Indemnity & Guarantee [letters of Indemnity and Letters of Guarantee]; Continuing Guarantee; Invalid Guarantee;
 - 2.1.3 Surety: Right of Surety; Liability of Surety; Discharge of Surety.
 - 2.1.4 Bailment: Definition; Essentials of bailment; Duties of Bailor; Liabilities of Bailee; Rights of Bailee; [e.g. Ports as bailee of cargo etc.]
 - 2.1.5 Pledge: Definition; Essentials of Pledge; Bottomry & Respondentia Bonds.
 - 2.2 Different types of agreements and contracts used in maritime sector
 - 2.2.1 Employment contracts (Articles of Agreement etc)
 - 2.2.2 Commercial contracts (Different charter parties and Indian Carriage of Goods by Sea Act, 1925; Bills of lading and Indian bills of lading Act, 1856; claused bills of lading etc)
 - 2.2.3 Ship managers' agreement (Different types of management contracts (e.g.: technical, crew etc.)
 - 2.3 Law of agency: General principles, types/creation of agency, legal relationship between the parties involved, rights & duties of Agent & Principal; breach of warranty of authority; Termination of Agency; Personal liability of agents.
 - 2.4 Overview of the Banking Law & Negotiable Instruments
 - 2.5 Arbitration and Dispute Resolution; process & procedure involved. Relevance of LMAA, ICA and other bodies.
3. Overview of criminal law (*Actus reus*, *Mens rea*, etc.)
 - 3.1 International criminal law with respect to Piracy, Armed robbery, Criminal trespass, Crimes against humanity etc
 - 3.2 National criminal law with respect to maritime sector from Indian Penal Code and Criminal Procedures Code
4. National Maritime legislations [The Merchant Shipping Act 1958, Admiralty Act, Carriage of goods by sea Act, 1925; Indian Bills of lading Act, 1856; Multimodal transport of goods Act; Inland vessels Act, 1917; Indian Ports Act, 1908; Major ports Act Maritime Labour Laws, etc]

10/6/19

5. International agreements and overview of the Vienna Convention on Law of Treaties.
6. United Nations, its specialized agencies [IMO, ILO, UNCTAD, UNCITRAL, UNDP, WMO, WHO, WTO etc] and other International Associations like IALA, IHO, etc.
7. International conventions [UNCLOS; IMO Conventions; ILO conventions; Rotterdam rules, Brussels conventions including convention on maritime liens, collision liability and arrests, International agreements and measures to prevent the spread of diseases by shipping, International organisation for medical advice & assistance at sea..etc], International Health Rules.
8. Maritime frauds: The modus operandi of maritime frauds in the past. Methods of investigation, detection and prevention of maritime frauds; the role of the international Maritime Bureau.
9. Law of torts

 16/1/19

1. **Limitations of various formulae for the following:**

Earth as a spheroid-compression, geographical and geocentric latitudes; Meridional part; Earth's orbit (eccentricity and applications, length of seasons); Theory of refraction (dips and distance of sea and shore horizons with and without refraction and related applications); Diurnal parallax and augmentation of moon's semi-diameter; Rates of change of azimuth; altitude and hour angle; Maximum and meridian altitudes; A-B-C tables; Ex-meridian tables; Pole-star tables for determination of latitude & azimuth; The equation of equal altitudes (above and below pole, etc.)

2. **Laws of planetary motion :**

Theory and application to orbital motions, Sidereal and synodic periods and applications, Moon's orbit and nodes, Ecliptic limits.

3. **Positional errors in fixes :**

Errors in terrestrial observations, position line and in fixes, the theory of the cocked hat and the three bearing formula and their applications, Errors in astronomical observations, position line and in fixes, Errors in fixes by vertical and horizontal sextant angles.

4. **Stellar magnitudes and distances :**

Variable stars & binary systems; Annual parallax; Aberration; Mean place of a star.

5. **Co- ordinate Universal time and time signals :**

6. **The theory and general appreciation of projections :**

Mercator; Transverse Mercator; Gnomonic; Lambert's-conical orthomorphic and Stereographic

7. **Special problems in navigation including :**

High latitude navigation; High speed surface craft; Sub-surface craft.

8. **Latest advancement in navigational equipments :**

(Fibre optic gyroscope, satellite compass, GPS compass, Laser beams, Infra-red techniques, Sub- marine acoustic transponders, Split beam channel guidance systems, Ship identification etc.,)

9. **Latest advancement in aids to navigation :**

(Virtual Aids of Navigation, Berthing aids, etc.,)

10. **Special navigation systems :**

The basic principle and use of (Integrated Navigation System; Dynamic Positioning Systems; The Inertial Navigation Systems.

 16/1/19

11. **Research and development :**

An outline knowledge of systems under development such as (Maritime Autonomous surface ships (MASS) etc.); Future challenges.

12. **Magnetism :**

Magnetic compass and magnetism; Properties of magnets; “hard” and “soft” iron, magnetic induction and permeability; magnetic fields; position of equilibrium; Molecular theory of magnetism; Magnetic effects of electrical currents; Errors of magnetic compass; Effects of magnets on a compass needle under varying conditions; Correcting errors of magnetic compass; Shipboard magnetic compass adjustment.

13. **Terrestrial and ship’s magnetism :**

variation, dip, total force, horizontal force, vertical force, local attraction; geographical variation and its effect on deviation; effects of permanent and induced magnetism; Components P, Q and R; the rods a, b, c, d, e, f, g, h and k. Sub-permanent magnetism and its effects at sea;

14. **Compass construction and siting :**

IMO Resolution A382(X); General principles (size and relative position; soft iron correctors; types of correctors used on ships; etc..) Magnetic screening;

15. **Compass adjustment :**

General principles of compass correction and the methods of finding and compensating for A, B, C, D and E types of deviation; different methods of swinging ship to obtain a deviation table; relation of components P, Q and R and the rods a, b, c, d, e, f, g, h and k to the various coefficients and to heeling error; sextantal and octantal deviations; use of the Kelvin deflector; principle of the deflector method and its limitation; rules to be followed with regard to the placing of correctors; “wiping” and degaussing; construction of a curve of deviations and its practical use in coefficient analysis; constant, semi-circular, and quadrantal deviation; analysis of a ship’s deviation book to determine causes of irregular deviations and suggest measures for their removal; analysis of a table of deviations; obtaining and explaining the approximate coefficients A, B, C, D and E; types of transmitting magnetic compass bowls and repeaters.

16. **Cyber Security:**

Definitions, general, security overview, digital security, cyber security awareness, different areas that are top priorities for security organizations, where threats are coming from in current global environment, reality of cyber attacks in our current global environment, National cyber security policy 2013, National Cyber Safety and Security Standards (NCSSS), National Cyber Defence Research Centre (NCDRC); Information Technology Act;


16/1/19

17. **Maritime Security on ships :**

Cyber security and safety management; Malware, viruses and spyware; identification of theft and compromise of classified data; dangers associated with emails (dangerous attachments, hoaxes, etc.); phishing, risks regarding removable media; USB stick dangers; File sharing and copyright issues (international regulations in usage of pirated and pornographic material); dangers related to mobile devices; dangers of unsecured wireless networks; desktop security; risks of social networking; unauthorized system access and characteristics of a strong password;

18. **Steps for maritime cyber security :**

Network security; malware prevention; risk management regime; secure configuration; managing user privileges; employees education and awareness; incident management; monitoring; removable media controls; remote system access risks associated with information; communication; navigation and automation systems on board; Maritime Cyber Security Risk Assessment (identify threats; identify vulnerabilities; assess risk exposure; develop protection and detection measures; establish contingency plans; respond to and recover from cyber security incidents; Identify vulnerabilities : Ship to shore interface; assess risk exposure; risk assessment made by the company; third-party risk assessments; risk assessment process; Develop protection and detection measures (Technical protection measures; procedural protection measures; establish contingency plans (Maritime Cyber Security Incident Response); respond to and recover from cyber security incidents (effective response; recovery plan; investigating cyber incidents; losses arising from a cyber incident); target systems; equipment and technologies; onboard networks;

19. **Cyber security in ports :**

Important of cyber security for ports; cyber security standards, guidance and good practice; port cyber security assessment and plan (CSA & CSP); review, monitoring and auditing of CSP;

20. **Managing cyber security :**

Role of the CSO; port cyber-security committee; security operations centre (SOC); provision of information to third parties; handling security breaches and incidents;

21. **Case studies and incident response procedures.**

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1. **Revision on fundamentals of Naval Architecture:**

Ship lines, coefficients of form, hull form characteristics, Bonjean curves, wetted surface, hydrostatic curves, cross curves of stability, inclining experiment, submerged equilibrium, stability when grounded, intact stability of unusual ship forms, subdivision and damage stability, intact stability and their parameters, stability criteria for damaged stability

2. **Resistance and propulsion :**

Review of fluid dynamics concepts, frictional resistance, wave making resistance and other components of resistance (viscous and wave resistance; Air resistance; Resistance due to roughness and fouling), ITTC friction formulation and extrapolation procedure, theory of propeller action, law of similitude for propellers, hull-propeller interaction, wake, model self-propulsion tests, blade element and lifting line; propeller characteristics and open water efficiency, screw propeller geometry, propeller thrust and torque, hull efficiency elements, ITTC performance prediction method, cavitation, other propulsion devices (jet propulsion, air propulsion, paddle wheels, vertical axis propellers) , Propeller design using standard series data;

3. **Stress and strain :**

Review of basics of stress and strain; simple bending theory, sectional modulus, their application to beams and ships. Stresses in still water and in a seaway. Murray's method; shear force and bending moment curves of ship shapes; stress indicators; understanding deck strength calculations; loading of break bulk cargoes & project cargoes;

4. **Ship motion :**

General concept of waves experienced in a seaway, six degrees of freedom, wave spectral density, rigid body dynamics of vessels and structures, ship response to regular and irregular waves, manoeuvring and control of ship motions, assessing ship's performance in a seaway, cause and methods of reducing each motion of ship; effect of ship motions on the stability and safety of vessel; capsizing of ship due to beam seas, following and quartering seas;

5. **Ship designs :**

Preliminary design methods, weight and cost estimate, general principles of powering, power requirement estimation, Powering performance calculations; Ship trials and trial data analysis; selection of principal design characteristics, general understanding of the design features contribution to the safety of the various types of ships including passenger car ferries, tankers, bulk carriers, OBOs, chemical tankers, LNG/LPG carriers, container ships, dredgers, hydrofoils, hovercraft, submersibles, nuclear ships etc.

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6. **Manoeuvring trials :**

The measured mile. Evaluation of steering characteristics and application to the design of hull & rudder, Angle of heel when turning, shallow water effect, interaction; manoeuvring, directional stability and control, manoeuvring devices, rudder area, forces and torques, ship handling, general predictions of manoeuvrability, modifying ship's manoeuvring performance;

7. **Stability :**

Stability of submerged vessels and semi-submerged vessels; longitudinal stability to a greater depth than done for Master; change in draft due to change in density; self righting life-boats; understanding the aspect of stability while Ro-Ro and Lo-Lo operation for heavy project cargo; comprehensive knowledge of the use of stability and stress data supplied to various types of ships including container vessels (LNG/LPG carriers, fishing vessels, dredgers, offshore support vessels, MODUs etc.)

8. **Stability at large of heel :**

Concept of righting moments and excitation moments; limitations of the wall-sided Formula and Attwood's Formula; limitations of GM as the stability criterion; cross curves of stability – Isocline curves – GZ curves and their significance;

9. **Dynamic stability :**

Dynamical stability and method of determination; residual dynamical stability and its use in determining the ability of a ship to survive dangerous situation such as wind and wave effects, passenger crowding, etc.; effect of trim, wind, gusts and turning on dynamical stability.

10. **Damaged stability :**

Flooding of ships and its effect on static & dynamical stability, resulting heel and trim; application to box-shaped and ship-shaped vessels; damage stability data;

11. **Dry-docking:** problems concerning block pressures, tripping of blocks, loaded ships, damaged ships, grounding etc.; problems of launching from a slipway; launching ways, poppets stopping a ship launching; launching diagram.

12. **Ship vibration :**

General knowledge of structural vibration in a ship; prevention and reduction of vibration;

13. Application of various integration formulae & methods used in ship calculations; Approximate formula to obtain KB of ship-shapes; fluid thrust on plane and curved surfaces; centre of pressure;

 16/1/19

EM203 : COMMERCIAL ENGINEERING, ROBOTICS AND ALTERNATE ENERGY

1. Basic features and operation:

1.1 Boilers :

Basic principles and major components; feed-water and circulation; generating tubes; drums and headers; Super-heaters; furnaces; Casings and support; Safeties; Boiler operations : Preparation and lighting off; Raising steam and cutting in on the line; Routine operation; Emergency procedures; Securing; Boiler accessories: Internal fittings and mountings; External fittings and mountings; Burners; Instrumentation and automation;

1.2 Diesel plant:

Preparation and starting of diesel engines; Manoeuvring; Running in after an overhaul; Routine operation; Emergency operation; Maintenance; Safeties: Trip , slow-down and Alarms;

2 Pumps :

Fundamentals; Fundamentals of fluid flow; Types of pumps; Centrifugal pumps; Reciprocating pumps; Rotary pumps; Jet pumps; Blowers and fans; Compressors; Pump operation; starting procedure (centrifugal pump; positive-displacement pump);

3 Electrical systems :

Fundamentals of electricity; Electrical power; Alternators and generators; Electric motors; electrical components and instruments; Shipboard electrical systems including synchronizing and power sharing of alternators; electric propulsion; different frequency of electrical power used on ships (50 Hz, 60 Hz etc); problems in sourcing spares for vessels operating on different frequencies including spares for lighting, air conditioning etc;

4 Shafting systems and Propeller :

Propeller shafts and stern-tube shafts; Line-shaft bearings; Stern tubes; Strut bearings, Propellers (fixed-pitch and controllable-pitch); Withdrawal of propeller and stern-tube shafts;

5 Heating, Ventilation, and Air-Conditioning :

Fundamentals of air conditioning; Categories of air-conditioning systems; Direct vs. indirect expansion; Compressors, chillers, and condensers System Components of refrigeration (compressor, evaporator, condenser, expansion devices, Refrigerants); Operation of refrigeration systems;

6 Auxiliaries (Principle, operation, maintenance and checks :

Fresh water Generator; Purifier; Oily water separator and oil discharge and monitoring systems; Incinerator; Sewage Treatment Plant; CO2 system; Fixed-Foam System; Hyper Mist System; I G System; I G Generator; Deck machinery and cranes; Hydraulic systems; Steering gear; Windlasses, winches, and capstans Pipe and tubing; Valves; Basic valve maintenance; Vent and sounding tubes;

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7 **Budgeting :**

Preparing budget estimates for the annual operation of different types of vessels (passenger, bulk carrier, tanker, LPG, LNG, High speed crafts etc.); preparing estimates for routine repairs of vessel as well as dry-docking of different types of vessels;

8 **Procurement of spares :**

Different makes of main engines, auxiliary engines, boilers, pumps, refrigeration systems, air-condition systems, deck machinery etc. currently in use; items that generally require replacement; process for sourcing spares for these items and the expected lead time;

9 **Energy efficiency :**

Energy Efficiency Operational Indicator (EEOI) and hoe it works to improve energy efficiency; Energy Efficiency Design Index (EEDI); IMO fuel consumption data collection system for ships; relevance of ship design in improving energy efficiency; importance of good hull design including bow shape and coating of hull; how propeller design can affect energy management; various propulsion techniques and energy management devices used in improving efficiency; Energy saving devices; waste heat recovery; different alternative energy methods of propulsion, e.g. wind and solar power; Innovative technologies and future ship concepts: new battery technologies are being used in shipping: Dual fuel engines; different types of exhaust cleaning systems and how they work; Abatement technologies (Sulphur Oxide (SOx) Scrubbers; Nitrogen Oxide (NOx) selective catalytic reduction (SCR); Engine EGR;

10 **Maritime robotics including artificial intelligence :**

Introduction to different types and applications of Maritime Robotic Systems including AUVs, ASVs, ROVs, underwater gliders and Argo floats; Navigation strategies and sensors for maritime robotic systems including SLAM; Path planning algorithms and line of sight guidance strategies

11 **Emerging technology :**

Introduction to block chain, cloud computing, internet of things, costing for installation of new systems like (sulphur reduction, ballast water etc).

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1. **International Conventions :**

United Nations Convention on Human Environment, 1972; United Nations Environment Programme (UNEP); Convention on the Prevention of Marine Pollution by dumping of wastes or other matter, 1972 (London dumping Convention); United Nations Convention on Law of Seas, 1982 (UNCLOS); MARPOL; Basel Convention on the control of Transboundary Movement of Hazardous Wastes and their Disposal, 1989 (Basel Convention); United Nations Convention on Environment and Development, 1992 (Earth Summit); Agenda 21; United Nations Convention on Biological Diversity, 1992; United Nations Framework Convention on Climate Change, 1992 (UNFCCC); UNFCCC, Kyoto protocol, 1997; 2002 & 2012 Earth Summit on Sustainable Development (Rio +10 and Rio +20); Commission on Sustainable development; Global Environment Facility (GEF); UNFCCC, Paris 2015; Regional Seas Programme; intergovernmental conference on biological diversity areas beyond national jurisdictions;

2. **Meteorology :**

Meteorological Observing Systems (conventional and recent systems) [Synoptic weather observations, Synoptic representation of pressure field, contour and thickness charts, stream line and isotach analysis, stability analysis, techniques of weather forecasting including elementary ideas numerical weather prediction]; Wind effects [Divergence, convergence, diffluence, confluence, vorticity, Coriolis and centrifugal effects balance motion, geostrophic and gradient wind, cyclostrophic wind, elementary ideas of general circulation and jet streams]; cyclonic storms: (formation, intensification, movement and weakening); methods of cyclone forecasting; cyclone warning bulletins of merchant ships; el-nino; la-nina;

3. **Satellite Meteorology :**

Historical development, Indian programme, remote sensing techniques, visual and infra-red Channels, synoptic cloud patterns and their interpretation, application of satellite data for tropical storm analysis, quantitative estimation of sea surface temperature and vertical profiles of temperature and humidity from satellite pictures.

4. **Geology and Oceanography :**

The Earth-its status & age; Active geological processes (volcanoes, earthquakes, erosion, glaciations); Genesis of rocks, types of rocks, distribution of rocks in the continents and oceans; Plate tectonic model- critical assessment of various views; Bathymetric studies in understanding the oceans- PDR, SOPAR, Mohole project, and Preparation of submarine atlas; Oceanic features (continental shelf-floor slope ridges, oceanic sedimentation, and understanding of modern terminology); General characteristics of the seas, bottom topography, coastline and beaches; Physical properties of seawater, light penetration and colour of the sea; heat budget of the oceans, distribution of salinity, temperature and density, water masses; Causes of ocean currents, surface & sub-surface circulation; Ice formation and decay, distribution and movement of ice;

5. **Marine Resources :**

- 5.1 **Fishing** : Types of fish, geographical location of fishing grounds, conservation of resources; Modern demersal and pelagic fishing methods; Factory vessels; Marine fish farming.
- 5.2 **Minerals** : Methods of extracting minerals from sea water; Desalination processes; Sand and gravel dredging; Extraction of minerals from the seabed, Sub-sea mining; seismic and sonar profiling; Seabed sampling;
- 5.3 **Oil and Gas** : Types of drilling rigs, drill ships, well head production platforms; storage facilities; Types of sea terminals; General ideas on drilling; Pipe laying and the use of submersibles;
- 5.4 **Power** : general ideas on harnessing energy from the sea; Tidal power stations.

6. **Ocean Governance :**

Ocean governance includes the processes, agreements, rules, institutions, etc. developed to organise the way in which humans use the ocean and its resources. ocean governance relates to the High Seas and international seabed "Area" which support vital biological resources; known also as 'Areas Beyond National Jurisdiction' (ABNJ); because they are beyond the remit of any single government to protect, they are subject to overexploitation, pollution and habitat degradation, which together are undermining vital Earth support systems; conservation and management of resources in ABNJ: UN agreement on conservation and management of Straddling Fish Stocks and Highly Migratory Fish Stocks; FAO Code of Conduct for Responsible Fisheries; intergovernmental conference on biological diversity areas beyond national jurisdictions; international seabed authority; commission on the limits of the continental shelf; sustainable development;

7. **Hydrographical Surveying :**

Basic techniques of surveying; Control; Position fixing including use of short-range high accuracy radio systems; Theory of preparation of navigation charts;

8. **The Earth's tides :**

- 8.1 Tidal theory : General knowledge of tides (Tide raising forces, The equilibrium tide, Modern tidal theory);
 - 8.2 Classifications of tides. Principal harmonic components Method of analysis and prediction
 - 8.3 Determination of mean Sea Level.
 - 8.4 Establishment of datums. Methods of transfer of datums along coasts.
 - 8.5 The use of co-tidal charts.
 - 8.6 Tidal streams and currents and their measurement
9. Seismic & Meteorological surveys, seiches, bores and related phenomena. Seasonal and long term changes in Mean sea Level.
10. Satellite remote sensing: Basic theory and its application to be marine environment.


16/1/19

EM302 : PORT MANAGEMENT

1. Introduction to ports :

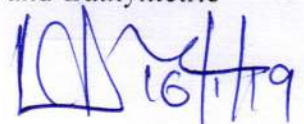
The geographic reasons for port location and the extent to which this may depend on the nature of hinterland and natural resources; different types of ports and access to ports (natural, man-made, river, estuary); different functions of ports (hub ports, feeder/transshipment ports, intermodal interfaces); different forms of the ownership structure of ports and of port services (public/private, landlord only, full or part service provider, terminal facilities within ports); governing structure and conservancy of ports; location of major world ports in liner, dry bulk and liquid trades; main places of origin and trade routes of important cargoes & seasonal variations; effect of globalisation on port choice; how changes in logistics and distribution patterns influence the development or decline of ports; the use of free port/free trade zones as an economic tool;

2. Port planning :

Economics of Port Location (Factors to be considered for selecting location of a port; Facilities of a port; Formulation of a port pricing; Organization of a port); port development policy including the role of government, regional needs and competition; planning principles and project planning; principles behind port layout, physical constraints, terminal planning, specialised terminals, multipurpose terminals and support operations; requirements of break-bulk, neo-bulk, special cargoes, dry bulk and liquid bulk commodities; flow analysis of cargo in a terminal and environmental factors and constraints; role of traffic forecasts; analysis of demand factors; implications for marketing; involvement of users; port capacity; Basic Knowledge of Navigation Channel Designing (PIANC Guidelines, Canadian Guidelines etc.); Regulation related to designing of Break Water etc.; Dredging Requirement; Different types of Dredgers (Trailer Suction, Cutter Suction, Water injection, Rock Dredger etc); importance of safety management; importance of security to prevent terrorism, illegal immigration, theft and smuggling; advantages of mechanization and automation of ports; different types of port equipments (Top Side Equipments (Equipments for loading /unloading of Cargo) such as Gantry Cranes, Mobile Harbour Cranes, Loading Arms (for Liquid Cargo); Storage Equipments Conveyor System, Stacker Reclaimer, RTGS, RMC, Wagon Tripper; Forklifts, Payloaders, Excavators, etc.; Harbour Crafts: Requirement of Tugs (Bollard Pull Requirement for Vessel Size), Pilot Launch, Mooring Boats); Cargo Evacuation (Road & Rail); financing of port development.

3. Port regulatory environment :

Nature of port constitutions and legal framework; Indian Ports Act 1908; major Port trusts Act, 19; Dock labour Board regulations; State Maritime Boards; explosive Act and Rules; Petroleum Act and Rules; Knowledge of IMSBC; OISD, ISGOTT; PIANC; Guidelines for port infrastructure; requirement for handling hydrocarbons (Liquid and Gas); Knowledge of Environment & Coastal Regulatory Zone (CRZ) Regulations 2011 for Port & Harbour; Regulations Related to handling Hydrocarbons, explosives and IMDG cargo in ports; Regulations related to Port Limit and Port Conservancy; quality management systems (ISO 9001, 14001, 18001, Integrated Management System); ISPS (Regulations related to Port Security Assessment & Security Plan); Navigational Safety in Ports Committee (NSPC); Rules for Navigation Channel Marking and Lighting; Rules for Port Charts and Bathymetric

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Surveys; Regulations Related to Oil Spill Contingency Plan (OSCP) for the Port; Various plans for Port Management such as Waste Management, Disaster Management Plan;; Basic Knowledge of Customs Act 1961; Regulations Related to Customs Cargo Service Provider (CCSP); Rules related to Customs Notified Area and Warehousing rules; role of trade unions and other labour organisations including ITF; role of statutory bodies (customs, immigration, port health, marine safety etc.); laws and regulations relating to the employment of dockworkers:

4. **Managing port operations and conservancy :**

Insurance for Ports; basic rationale of port business; ports structure, delivery of services and the relationship between infrastructure, conservancy, navigation and handling facilities; typical port organisational structure; Port Performance Parameters (Pre-berthing delay, Berth Occupancy, Vessel Turn-around time, Throughput per day per berth); UNCTAD Guidelines for Berth Occupancy and justification for increase in berth length in a port; calculations and the relationship between berth occupancy, service time and waiting time, and also berth throughput; nature of marine operations (conservancy, dredging, navigation aids, navigation control etc.) management of cargo operations ashore; importance of avoiding traffic and cargo congestion; requirement for regular interaction with port users (ship-owners and operators, ship agents, forwarders, truckers, rail and barge operations); information flow requirements of the port, statutory bodies and port users; port community systems; port performance indicators (PPI) and key performance indicators (KPI); berth planning; cargo planning (storage & evacuation); quay transfer operations; storage, receipt and delivery operations; use of KPI for future planning in ports and terminals; proper container terminal capacity (PCTC); automated container terminals;

5. **Port Competition, Marketing and Business Development :**

Nature of port competition (national and international); need for market information (trade growth, hinterland Traffic, vessel development, commercial needs and financial viability); relevance of geographic location with reference to transit time and port rotation; role of ship-owners/ship-operators, shippers/receivers, freight contractors, forwarders and other transport interests (for example, railways, road hauliers) in competitiveness of port; various techniques of port promotion and how they assist with identification of potential users; impact of inland transportation and inland depot/handling facilities; scope for collaboration on through transport;

6. **Port Pricing :**

The nature and types of port charges including those incorporating statutory navigational services, services to vessels, services to cargoes; difference between Vessel Related Charges (e.g. Port Dues, Berth hire, VTMS , Pilotage, Towage, ILH dues etc.) and Cargo Related Charges (e.g. Terminal Handling Charges (THC), Wharfage Charges, Storage Charges etc.) cost factors in pricing (e.g. infrastructure, navigation services, equipment, staff & labour, marketing, security and safety, environmental services); pricing policy ('not for profit', government influenced, fully commercial); effects of competition on pricing policy and how pricing is used as a tool to influence demand; various factors used in establishing pricing structures (e.g. lengths of time included in base charge for vessels and cargo); units on which charges are based; simplicity of application and transparency; volume rebates;

various regulatory mechanisms including user appeals against charges; integration of port charges with charges of other port operators and inland transport organisations and through transport charges.

7. **Port Finance :**

importance of financial management in port operating (budgets, capital and revenue expenditures and investment appraisal); importance of financial and commercial objectives including the analysis and monitoring of costs and port cost accounting; corporate analysis of financial data and for budgetary planning and control; project evaluation, review techniques and capital budgeting; financial and economic appraisal of port investment proposals and traffic forecasting; joint venture opportunities for financing or management and policies for both common and sole user terminals.

8. **Port Ownership :**

Different types of ownership including national- or local government-owned and managed, public sector-owned ports and port trusts and the trend towards deregulation of ports; transfer of party from state to private ownership; methods of privatisation, sale of shares, management and employee buyouts; private sector-owned ports; different types of ownership (outright, public sector ownership of port infrastructure combined with private sector provision, public ownership of port superstructure with private management and/or operation and the associated issues of lease contracts and joint ventures); development, ownership and control of free ports and free zones;

9. **Port Agency :** Role of a Port Agency , Customs House Agent (CHA)

10. Port labour, health, safety , security and the environment


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EM303 : COMMERCIAL SHIPPING MANAGEMENT

1. Commercial shipping :

International chartering market (London, New York, Hong Kong; Tokyo, Singapore); The Baltic Exchange; ship-broker; brokers responsibility to the principal; remedies for broker in case of breach; procedure of negotiation; cargo circulars; indications & firm offers; financial elements of charter parties (freight – per ton , or lump sum); hire calculations; dry cargo chartering; Tanker chartering; Differences and similarities between dry cargo and tanker chartering; charter party disputes; laytime calculations; deductions from freight; excepted periods; time charter (off-hire periods; final voyage; payment of hire; bunkers; performance clauses); frustration of charter party; calculation of demurrage; voyage estimate and calculations; container operations; passenger operations; bills of lading; post-fixture actions;

2. Sale and purchase of ships :

Shipbuilding contracts; functions of sale and purchase broker; prior-purchase inspection; interpretation of ship's classification records; valuation (duties of valuer); memorandum of agreement; vendor's and buyer's responsibilities; bill of sale; insurance; transfer of flag & ownership and documents required;

3. Port Agency :

Relationship between port agent and their principals, method of appointment (directly by ship-owner, by ship-owner as per nomination of charterer, by time charterer); scope of port agents work; disbursement account;

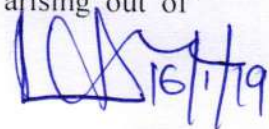
4. Liner agency :

Additional duties over and above those of a port agent; relationship with exporters, shippers, receivers, forwarders, NVOCs etc;

5. Shipping management: Overview of modern shipping management; ship management structures, measurement of strategic performance; identifying strategic challenges; analyse application of risk management methods including shipping derivatives in business practice;

6. Marine insurance :

History and evolution of marine insurance; principles of marine insurance; fixed premium; concept of mutuality; P&I associations (difference between protection and indemnity); marine insurance companies and its organisational structure; Protection & Indemnity associations (P&I Clubs) and their organizational structure, (constitution of modern P&I Clubs; Committee's/Board's responsibilities; Management of the Club; Rating of Risks & Fixing of Calls; Premium rating system; Advance & Supplementary calls; Release calls; risks insured under P&I cover; limitation to Club's cover); Lloyds market and its organizational structure; role and function of an insurance broker; different types of risk covered (Hull & Machinery, Freight & Hire, Cargo Liability, Employee Liability; War Risk; Diversion liability; stowaways/refugees/quarantine; Third party liabilities (collision, damage to other property, death and personal injury, pollution liability); liabilities arising out of

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international Conventions like CLC, Bunker, Wreck removal and MLC; Risks and cover available for professionals service providers [surveyors, brokers; contractual carriers / freight forwarders]; International Underwriting Association; Marine Insurance Act, 1963; Basis of Underwriting/rating; Important Institute clauses (Hull, Time, Voyage, Cargo, War, Strike, Inland transit); Excluded perils (3/4th collision liability); Duty to act as prudent un-insured; pay to be paid clause; marine re-insurance

7. **Types of policies :**

Types of policies – Specific policy, Open policy, Open cover & Cover note; Advantages of an open cover; Certificate of insurance; Annual policies; Duty Insurances; Increased value insurance; Sellers contingency policy; Annual sales turnover policy only; Multimodal transport policy;

8. **Cargo Insurance :**

Basis of Rating : Underwriting factors; Information essential for proper assessment of the risk; Factors considered in acceptance & rating of the risk; Payment of premium; Exchange control regulations regarding payment of premiums on cargo policies covering exports & imports called GIM (General Insurance Memorandum).

9. **Cargo Insurance Claims :**

Types of Losses/Expenses; ATL, CTL, PA, GA Loss, Salvage and Sue & Labour expenses; Forwarding charges, Extra charges; Cargo claims — Procedure; Legal Aspects of recovery against the carrier.

10. **Indian Insurance :**

Government of India Scheme of War Risk Insurance of Main Hull; War risk insurance (Applicability, Features, Scope of cover; Detainment); War Risk Trading Warranty under war risk insurance scheme; Current exclusions; Indian Insurance and re-insurance companies;

11. **Average adjustment :**

York Antwerp Rules and average adjustments including its practical application and methodology of adjustments

12. **Cabotage :**

Concept of cabotage, principle of cabotage in other modes of transport; the Jones Act and Navigation acts; Cabotage in other countries and in India;

13. **Risk Management :**

Introduction (historical context); concept (Definitions of risk, safety and hazard), process & practice; Types of Risks; Risk identification; Risk Evaluation, Risk Control; Risk Handling; Formal Safety assessment; Risk Matrix.

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14. **Risk assessment fundamentals :**

Basic definitions and concepts; Risk identification – hazard evaluation - underlying causes – consequences of potential incidents – risk estimation – frequency of incidents – examples, case studies – risk evaluation – risk acceptance criteria – the “ALARP” principle

15. **Risk control options (RCO's) :**

Probability reducing RCO's; Land-based safety systems – passive systems (fairways, lights, TSS) – active systems (pilotage, VTS) – on-board safety systems – alert systems – observation systems – communication equipment – measures to influence subjective behaviour – legal sources – IMO instruments (conventions, ISM, ISPS) – national legislation – training

16. **Consequence limiting RCO's :**

Technical (naval architectural) systems – passive systems (structural fire protection, cargo securing) – active systems (redundancy, separation etc.) – organizational measures (fire fighting, evacuation etc.) – administrative measures (SAR, salvage, places of refuge)

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