



Government of the People's Republic of Bangladesh
Ministry of Shipping



Bangladesh Marine Academy

(A branch of World Maritime University, Malmo, Sweden since 1990)
(Affiliated to Bangabandhu Sheikh Mujibur Rahman Maritime University since 2013)



Curriculum of 4-Year “Bachelor of Maritime Science (Engineering)”

Submitted by: Engineering Department

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Section: 1

Regulations for 4-year Bachelor of Maritime
Science (Engineering) Degree programme

**1. Duration and Total credits**

The proposed Bachelor of Maritime Science (Engineering) degree spreads over 4-year and carry a total of 162 Credits. There will be 100 marks for each credit which will consists of 1 (one) class hour per week for theoretical subjects and 2 (two) class hour per week for sessional subjects for a period of 1(one) term.

There will be two terms (term 1 and term 2) in each academic year. The duration of each term will be of 18 weeks, which will be used as follows:

Classes	14 weeks
Recess before term final examination	2 weeks
Term final examination	2 weeks

Each term will consist of 26 credits and third year on-board or practical field training will consist of 6 credits. Each student should complete minimum 500 hours work load in each term. The workload indicates the time cadets typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self study and examinations) required to achieve the expected learning outcomes.

2. Year 1 & 2

The 1st term period will be February to June and 2nd term period will be July to December for the 1st and 2nd year. Weekly classes will be in 5 days and 5 hrs per day theoretical class (0815 hrs to 1315 hrs) and practical / demonstration classes will be 2 hrs (1415 hrs to 1615 hrs) .

3. Year 3

The 3rd year period will be covered on board by completion of 12 months practical sea service under supervision of on-board management level officers of the respective ship or in any dockyard, shipbuilding yard, ship-owner or ship manager's office as approved by the appropriate authority.

4. Year 4

The 1st and 2nd term of 4th year period will start from first week of March and September in each academic year.

5. Time Limits for Completion of the Bachelor Degree

A student must complete his/her studies i.e. complete 162 credits within a maximum period of 8 (eight) years.

6. Course Pattern and Numbering System

The entire programme is covered through a set of theoretical and sessional courses. Each course is designated by 'ME' identifying Marine Engineering Department followed by a four-digit number with the following criteria:



The first digit corresponds to the year in which the course is normally taken.
The second digit corresponds to the term in which the course is normally taken.
The last two digits will usually be odd for theoretical and even for sessional courses.

7. Grading System

The grading system throughout the programme will be as follows:

Numerical Grade	Letter Grade	Grade Points(GP)
80% and above	A+ (A Plus)	4.00
75% to 79%	A (A Regular)	3.75
70% to 74%	A- (A Minus)	3.50
65% to 69%	B+ (B Plus)	3.25
60% to 64%	B (B Regular)	3.00
55% to 59%	B- (B Minus)	2.75
50% to 54%	C+ (C Plus)	2.50
45% to 49%	C (C Regular)	2.25
40% to 44%	D	2.00
Less than 40%	F	0.00

8. Calculation of GPA

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student. For example, if a student passes/completes five courses in a term having credits of C1, C2, C3, C4, and C5 and his grade points in these courses are G1, G2, G3, G4, and G5, respectively then:

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

9. GPA Requirements for Obtaining Graduation

The minimum GPA requirement for obtaining a bachelor's degree in Marine Engineering is 2.25.

10. Distribution of Marks

Thirty percent (30%) of marks shall be allotted for continuous assessment, i.e., quizzes and homework assignments, in class evaluation and class participation. The remainder of the marks will be allotted to TERM FINAL examination which will be supervised by Bangabandhu Sheikh Mujibur Rahman Maritime University. The distribution of marks for a given course will be as follows:



Serial no.	Examination type	Weightage
1.	Class Participation	10%
2.	Homework Assignment and Quizzes	20%
3.	Final Examination (3 hours)	70%
4.	Total	100%

11. Time duration for written examinations

The time duration for term end written examination for all the 2 (two) and 3 (three) credits course will be 3 (three) hours.

12. Earned Credits

The courses in which a student has obtained 'D' or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credits. A student who obtains 'F' grade in a minimum two course in any term will have to appear the examination of same course in subsequent years. If a student obtains 'F' grade in more than two courses or earn GPA less than 2.5 in any term will not be allowed to promote in next term but to continue the full course of that term in subsequent year. When a student will repeat a course in which he / she previously obtained 'F' grade, he/she will not be eligible to get a grade better than 'B' in such a course. If a student obtains a grade lower than 'B' in a course, he/she will be allowed to appear the examination of the same course only once for the purpose of grade improvement by forgoing his/her earlier grade, but he/she will not be eligible to get a grade better than 'B' in such a course. A student will be permitted to repeat for grade improvement purposes a maximum of four courses per term. If a student obtains 'B' or a better grade in any course, he/she will not be allowed to repeat the course for the purpose of grade improvement.

13. Performance Evaluation

The performance of a student will be evaluated in terms of two indices, viz. term grade point average, and cumulative grade point average, which is the grade average for all the terms. The term grade point average is computed dividing the total grade points earned in a term by the number of term hours taken in that term. The overall or cumulative grade point average (CGPA) is computed by dividing the total grade points accumulated up to date by the total credit hours earned.

14. Attendance, Conduct, Discipline etc.

All students are expected to attend classes regularly. The first responsibility of a student is to attend classes regularly, and one is required to attend at least 60% of all classes held in



every course. A student should not be absent from quizzes, tests, etc. during the term. Such absence will naturally lead to reduction in points/marks which count towards the final grade. Absence in Term Final Examination will result in 'F' grades. A student who has been absent for short periods, up to a maximum of three weeks due to illness, should approach the course in charge or head of the department for a make-up quizzes or assignments immediately on returning to the classes.

15. Programme Monitoring Committee

To keep pace with new developments in the field of Maritime science and Technology, the University will update the course curriculum at frequent intervals (at least every three years). Such updating will aim not only to include the expanding frontiers of knowledge in the maritime field but also to accommodate the changing social, industrial and professional needs. This will be done through deletion and modification of some of the courses and also through the introduction of new ones. With these views the University will constitute a programme monitoring committee with representatives from Bangladesh Marine Academy and Department of Shipping. The committee will monitor and evaluate the performance of the course. The committee may also propose from time to time to the University any changes and modifications needed for upgrading the curriculum and the course system.

16. Procedure to complete 3rd Year

Each cadet must serve in ocean going merchant vessel for 12 months, which should be recorded in the Continuous Discharge Certificate (CDC) book and the training is documented in an approved training record book. As an alternative to the on-board training, cadets may perform 12 months apprenticeship in a Ship Owner, Managers or Agents company, Port Authority, Shipyard, Dry-dock, marine workshop, coastal ships of 500 GT and above, and any other similar organization approved by the University.

The assessment of the 3rd year will be conducted on Training Record Book, assignments and by oral examination. For Training record book the marks allocated will be 200, submission of various assignments or drawing of the ship will be 200 marks and the oral examination will be 200 Marks.

17. Name of the Certificate

After successful completion of 4-year programme and 162 credits the students will be issued with certificates as follows:

Bachelor of Science (honors), Marine Engineering for those who completed 3rd year on board the vessel.

Bachelor of Maritime Science (honors), Marine Engineering for those who completed 3rd year in alternative method.



Section: 2

List of Courses with course number,
credits, contact hours and marks



1st Year 1st Term

Serial no.	Course Code	Course Title	Credits	Contact Hours	Marks
Theoretical Courses					
1.	ME 1101	English	2	28	200
2.	ME 1103	Applied Physics- I	2	28	200
3.	ME 1105	Applied Mathematics- 1	2	28	200
4.	ME 1107	Bangladesh Studies and Emergence of Maritime Sector in Bangladesh	2	28	200
5.	ME 1109	Managerial Economics	2	28	200
6.	ME 1111	Marine Internal Combustion Engines-I	3	42	300
7.	ME 1113	Workshop Process and Materials	3	42	300
8.	ME 1115	Ship Structure and Construction	3	42	300
9.	ME 1117	Basic Electro-Technology	3	42	300
Sessional Courses					
10.	ME 1102	English Sessional	1	28	100
11.	ME 1118	Basic Electro-Technology Sessional	1	28	100
12.	ME 1120	Computer Fundamentals and Applications	1	28	100
13.	ME 1122	Hand and Power Tools Sessional	1	28	100
TOTAL			26	420	2600



1st Year 2nd Term

Serial no.	Course Code	Course Title	Credit	Contact Hours	Marks
Theoretical Courses					
1.	ME 1201	Applied Physics- II	2	28	200
2.	ME 1203	Applied Mathematics-II	2	28	200
3.	ME 1205	Accounting and Finance	2	28	200
4.	ME 1207	Basic Maritime Safety and Security	3	42	300
5.	ME 1209	Maritime Legislation	3	42	300
6.	ME 1211	Marine Internal Combustion Engines -II	3	42	300
7.	ME1213	Marine Boilers and Steam Engineering	2	28	200
8.	ME 1215	Pump and Pumping Technology	2	28	200
9.	ME 1217	Basic Electronics	3	42	300
Sessional Courses					
10.	ME 1202	Physics Sessional	1	28	100
11.	ME 1208	Basic Maritime Safety and Security Sessional	1	28	100
12.	ME 1218	Basic Electronics Sessional	1	28	100
13.	ME 1220	Maritime English and Communication Skills	1	28	100
TOTAL			26	420	2600



2nd Year 1st Term

Serial no.	Course Code	Course Title	Credit	Contact Hours	Marks
Theoretical Courses					
1.	ME 2101	Leadership and Principles of Management	2	28	200
2.	ME 2103	Computer Programming	2	28	200
3.	ME 2105	Marine Environment and Technology	2	28	200
4.	ME 2107	Marine Internal Combustion Engines -III	3	42	300
5.	ME 2109	Shafting, Propeller and Steering Technology	2	28	200
6.	ME 2111	Naval Architecture	3	42	300
7.	ME 2113	Applied Heat	3	42	300
8.	ME 2115	Machine Drawing -1	2	28	200
9.	ME 2117	Electrical Machines	3	42	300
Sessional Courses					
10.	ME 2104	Computer Programming Sessional	1	28	100
11.	ME 2118	Electrical Machines Sessional	1	28	100
12.	ME 2120	Machine Tools Sessional	1	28	100
13.	ME 2122	Welding Technology	1	28	100
			26	420	2600



2nd Year 2nd Term

Serial no.	Course Code	Course Title	Credits	Contact Hours	Marks
Theoretical Courses					
1.	ME 2201	Advanced Maritime Safety & Security	3	42	300
2.	ME 2203	Basic Oil and Chemical Tanker Cargo Operation	2	28	200
3.	ME 2205	Turbocharger and Scavenging Technology	2	28	200
4.	ME 2207	Engineering Watch Keeping	2	28	200
5.	ME 2209	Applied Mechanics	3	42	300
6.	ME 2211	Control Engineering-I	3	42	300
7.	ME 2213	Refrigeration and Air conditioning Technology	2	28	200
8.	ME 2215	Machine Drawing-II	2	28	200
9.	ME 2217	Power System Protection	2	28	200
Sessional Courses					
10.	ME 2202	Advanced Maritime Safety and Security Sessional	2	56	200
11.	ME 2210	Applied Mechanics Sessional	1	28	100
12.	ME 2218	Power System Protection Sessional	1	28	100
13.	ME 2220	Maintenance of Main & Auxiliary Machineries	1	28	100
			26	434	2600



3rd Year 1st and 2nd Term

Serial no.	Course Code	Course Title	Credits	Marks	Remarks
1.	ME 3002	On-Board Training An approved seagoing service of not less than 12 months as part of an approved training programme which includes onboard training that meets the requirements of section A-III/1 of the STCW Code and is documented in an approved training record book.	6	600	
2.	ME 3004	Alternative Students may perform 12 months apprenticeship in a ship management company, port authority, Ship yard, dry-dock, power plant, marine workshop, Engine manufacturer and distribution company or any other similar organization approved by Bangabandhu Sheikh Mujibur Rahman Maritime University	6	600	
			6	600	



4th Year 1st Term

Serial no.	Course Code	Course Title	Credits	Contact Hours	Marks
Theoretical Courses					
1.	ME 4000	Thesis on Maritime Topics	4	56	400
2.	ME4101	Research Methodology	2	28	200
3.	ME 4103	Manoeuvring and Associated System.	3	42	300
5.	ME 4105	Fuels and Lubricants	2	28	200
6.	ME 4107	Fuel Combustion System and Energy Efficiency	3	42	300
8.	ME 4109	Deck Machinery and Cargo Equipment	2	28	200
9.	ME 4111	Engineering Materials	2	28	200
10.	ME 4113	Radio Navigation and Communication Technology	2	28	200
11.	ME 4115	Electrical Installation and Instrumentation	3	42	300
Sessional Courses					
12.	ME 4116	Electrical Installation and Instrumentation Sessional	1	28	100
13.	ME 4118	Engine-Room Simulator Sessional	2	56	200
			26	406	2600



4th Year 2nd Term

Serial no.	Course Code	Course Title	Credits	Contact Hours	Marks
Theoretical Courses					
1.	ME 4000	Thesis on Maritime Topics	4	56	400
2.	ME 4201	Professional Ethics	2	28	200
3.	ME 4203	Control Engineering- II	2	28	200
4.	ME 4205	Basic Mechatronics	2	28	200
5.	ME 4207	Ship repair and Ship Building Technology	2	28	200
Sessional Courses					
4.	ME 4204	Control Engineering Sessional	1	28	100
5.	ME 4206	Mechatronics Sessional	1	28	100
		Any four Courses			
1.	ME 4221	Advance Oil Tanker Cargo Operation	3	42	300
2.	ME 4223	Advance Chemical Tanker Cargo Operation	3	42	300
3.	ME 4225	Maritime Economics	3	42	300
4.	ME 4227	Maritime Safety and Environmental Administration	3	42	300
5.	ME 4229	Supply Chain Management	3	42	300
6.	ME 4231	Integrated Coastal Zone and Fisheries Management	3	42	300
7.	ME 4233	Marine Offshore Technology	3	42	300



8.	ME 4235	Maritime Law and Policy	3	42	300
9.	ME 4237	Marine Insurance and Risk Management	3	42	300
10.	ME 4239	Shipping Management	3	42	300
11.	ME 4241	Energy Management and Innovation in the Maritime Industry	3	42	300
12.	ME 4243	Dredger and Dredging Technology	3	42	300
13.	ME 4245	Shipyard Management	3	42	300
14.	ME 4247	Port and Harbour Engineering	3	42	300
15.	ME 4249	Marine Surveying and Casualty Investigation	3	42	300
			26	392	2600

Non-Degree Credits

Serial no.	Course Code	Course Title	Credits	Marks	Remarks
1.	ME 0001	Contemporary Maritime Issues			
2.	ME 0002	Discipline and Teamwork			



Section: 3

Course Description: 1st Year 1st Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**



English

Course Code : ME 1101
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide an understanding in English language such that the students can use English in written and oral form in day to day life in a multicultural environment.

Learning Outcomes:

Successful completion of this course shall enhance the students English language competences and provide the skills necessary to carry out internal and external communication while on board the vessel.

Syllabus Contents:

Grammar - Structure of sentences - Active / Passive Voice - Direct / Indirect Narration;
Essay - Descriptive - Comparative - Argumentative - Thesis statement- Structure of opening / concluding paragraphs - Body of the essay;
Reading Comprehension - Global- Contextual- Inferential- Select passages from recommended text;
Business Correspondence - Letter Writing – Formal, Drafting, Bio-data Resume'/Curriculum Vitae;
Report Writing - Structure, Types of report - Practice Writing;
Communication / Public Speaking skills, Features of effective speech, verbal-nonverbal;
Group discussion - principle – practice;
The places and manners of articulation of the English sounds;
Vocabulary;
Comprehension;
Composition on current affairs;
Précis writing;
Short stories written by some well known classic writers.

Recommended Text(s):

P.C Das- Applied English Grammar and Composition
C.A Ali, J.B Sarwar, and Hasan- Degree compulsory English for Pass and Honours
P.C Wren & Martin- High School English Grammar and Composition
Rajendra Pal & J.S. Korlahali- Essentials of Business Communication
Raymond V. Lesiker- Business Communication Theory and Application
English language Books 1 & 2 - L. A. Hill, C. J. Daswani & C. T. Daswan



Applied Physics-I

Course Code : ME 1103
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide an understanding on the concepts, principles and processes of basic science in the particular field of structure of matter, electricity and magnetism, and modern physics.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Properties of matter and problems related to physics of materials on the atomic and molecular state.
- Basic concept of electricity and magnetism such as potential and field.
- Relativity and quantum physics
- Relate concepts together and to the other areas of physics.

Syllabus Contents:

1. Structure of Matter:

Crystalline and non-crystalline solids, Single crystal and poly-crystal solids, Unit cell, Crystal systems, Co-ordinations number, Crystal planes and directions, NaCl and CsCl structure, Packing factor, Miller indices, Relation between inter-planer spacing and Miller indices, Bragg's Law, Methods of determination of inter-planer spacing from diffraction patterns; Defects in solids: Point defects, Line defects, Bonds in solids, Inter-atomic distances, Calculation of cohesive and bonding energy, Introduction to bond theory, Distinction between metal, Semiconductor and insulator.

2. Electricity & Magnetism

Coulomb's Law, Electric field (E), Gauss's Law and its application, Electric potential (V), Capacitors and capacitance, Capacitors with dielectrics, Dielectrics-an atomic view, Charging and discharging of a capacitor, Ohm's Law, Kirchoff's Law, Magnetic field, Magnetic induction, Magnetic force on a current carrying conductor, Torque on a current carrying loop, Hall effect, Faradays Law of electromagnetic induction, Lenz's Law, Self induction, Mutual induction, Magnetic properties of matter, Hysteresis curve, Electromagnetic oscillation, L-C oscillation and its analogy to simple harmonic motion.



3. Modern Physics:

Michelson-Morley's experiment, Galilean transformation, Special theory of relativity and its consequences, Quantum theory of radiation, Photo-electric effect, Compton effect, Wave Particle duality, Interpretation of Bohr's postulates, Radioactive disintegration, Properties of nucleus, Nuclear reactions, Fission, Fusion, Chain reaction, Nuclear reactor.

Recommended Text(s):

Introduction to the physics of matter, 2014, Nicola Manini, Publisher: Springer.

Electricity and magnetism, 3rd edition, Edward M. Purcell, David J. Morin, Publisher: Cambridge University Press.

Modern Physics, Jeremy Bernstein, Paul M. Fishbane, Stephen G. Gasiorwicz

Modern Physics for scientists and engineers, John Taylor, Chris Zafirator, Michael A. Dutson.

Fundamental of Physics, 10th edition, Halliday and Resnick, Publisher: Jearl Walker.

Properties of Matter, 2015, Brijlal and N. Subrahmanyam

Elements of Properties of Matter, 2007, D.S Mathur

Concept of Electricity and Magnetism, A.K Rafiquallah, Students Publications.



Mathematics-I

Course Code : ME 1105
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class test
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes used in algebra, trigonometry and statistics in order to carry out any calculations required in the courses leading to the operation and management level certificate of competency or any other higher study in the maritime domain.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Algebraic problems relevant to inequalities, theory of equations, determinants, matrices and summation of series.

Trigonometrical problem relevant to De-moivres theorem, exponential functions of complex arguments and Gregory's series.

Statistical problems relevant to Discrete and continuous variables, Frequency Distributions, Mean, Median and Mode, Mean deviation and standard deviation, Correlation and its applications

Syllabus Contents:

Algebra:

Inequalities

Theory of Equations: relations between roots and Co-efficient; Sums of the power of the roots; Descartes' rule of signs; increasing or decreasing all roots of the equation by the same number.

Determinants: Determinants up to the third order; Elementary properties.

Matrices: Different kind of matrices; elementary properties; solution of systems of equations.

Summation of series.

Trigonometry:

De Moivres' Theorem

Deduction from De-Moivres' Theorem

Trigonometrically and exponential functions of complex arguments

Gregory's Series



Statistics:

Discrete and continuous variables
Frequency Distributions
Mean, Median and Mode
Mean deviation and standard deviation
Correlation and its applications

Recommend Text(s):

Rahman and Bhattacharjee, 2011, A text book on Co-ordinate Geometry with vector analysis, 6th edition. Distributor: New Book Palace, Dhaka.
S.A Sattar, 2008, A text book on Higher Trigonometry, All Publishers.
S.P Gupta and M.P Gupta, 2014, Business Statistics, Publisher: Sultan Chand & Sons
Shahidullah and Bhattachargee, 2015, A text book on Higher Algebra, Publisher: New Book Palace.



Bangladesh Studies and Emergence of Maritime Sector in Bangladesh

Course Code : ME 1107
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class test
Faculty in Charge :

Aims:

To enlighten the students on the national identities i.e. culture, social structure, constitution and various national issues that include social problem and development agendas of the country. The course is also aimed at giving specific knowledge on the activities of the maritime domain of the country.

Learning Outcomes:

After successful completion of this course, the students will have clear understanding on:

History, culture, climate, geography, environment and development agenda of the government of Bangladesh.

Bangladesh's heritage and cultural influences, and about events which have shaped national identity.

A general overview on the maritime affairs in Bangladesh.

Syllabus Contents:

History of the Emergence of Independent Bangladesh: Proposal for undivided sovereign Bengal and the partition of the Sub-Continent, 1947; Pakistan: Structure of the state and disparity; Language movement and quest for Bengali identity; Military rule: the regimes of Ayub Khan and Yahia Khan (1958-1971); Rise of nationalism and the movement for self determination; Election of 1970 and the declaration of independence; The war of liberation 1971, and Independent Bangladesh

Description of the country and its people: Topography of Bangladesh; Demography of Bangladesh; Climate of Bangladesh and Natural Resources of Bangladesh.

Society and Culture: Social structure; Social problem- Poverty; Unemployment Drug addiction and Corruption.

Some provisions of the Constitution of Bangladesh: Basic knowledge on the Constitution of Bangladesh; Parliament; Judicial system of Bangladesh and Administrative system of Bangladesh



Economic Sector Highlights: Agriculture; Industry; Energy, Trade and Commerce and Financial Administration of GOB

Emergence of Maritime Sector in Bangladesh: Historical background; Bangladesh in International Maritime Forum

Maritime Cluster in Bangladesh: Maritime Administration; Maritime Human; Resource Development; Sea-Ports and Port infrastructure; Ship management and logistic services in Bangladesh; Inland Shipping in Bangladesh and Shipbuilding industry in Bangladesh

Bangladesh Maritime Sector Highlights: Ship recycling in Bangladesh; Management of Marine Fisheries Resources in Bangladesh and Hydrocarbon exploration in the deep offshore area in Bangladesh.

Contemporary Maritime Issues: Delimitation issue; Maintaining law and order at Sea.

Recommended Text(s):

History of the emergence of independent Bangladesh, Sabiha Islam and Dr. Md. Ibrahim Khalil, 2014, Merit Fair Publishers, Dhaka.

Bangladesh economic reviews, Finance division, Ministry of Finance, www.mof.gov.bd

The constitution of Bangladesh

Bangladesh Economic Survey and regular updates by Bangladesh Bank, Ministry of Finance, Bangladesh Bureau of Statistics, World Bank, Asian Development Bank, IMF, WTO etc.

Web site of Ministry of Shipping: www.mos.gov.bd; Department of Shipping: www.dos.gov.bd; Bangabandhu Sheikh Mujibur Rahman Maritime University: www.bsmrstu.edu.bd; Bangladesh Marine Academy: www.macademy.gov.bd; Marine Fisheries Academy: www.mfa-mofl.org; National Maritime Institute: www.nmi.gov.bd; Chittagong Port Authority: www.cpa.gov.bd; Mongla Port Authority: www.mpa.gov.bd; Bangladesh Inland Water Transport Authority: www.biwta.gov.bd; Bangladesh Inland Water Transport Corporation: www.biwtc.gov.bd; Department of Fisheries: www.fisheries.gov.bd; Bangladesh Coastguard: www.coastguard.gov.bd.



Managerial Economics

Course Code	: ME 1109
Credits	: 2.0
Contact Hours	: 28
Assessment	: Term end written examination, Class test
Faculty in Charge	:

Aims:

To provide an understanding of the basic concepts, principles and processes used in Economics that is particularly necessary to perform managerial functions.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze basic economic theory and analytical tools that can be used in decision making problems. Moreover the course will impart the students with the knowledge of economic concepts, direct managerial applications, and analytical skills through integrating the knowledge of economic theory with decision making process and practices.

Syllabus Contents:

Introduction to Micro to Managerial Economics: Definition of Economics, Micro and macro economics – an Overview, relationship between economic theory and managerial decision, the nature and objectives of firms, the concepts of profit, alternative objectives of firms, the decision making model, and constraints of decision making.

Basic tools: Functional relationship, Economic model, Calculus and optimization, regression analysis.

Demand theory and analysis: Individual and market demand, total and marginal revenue, elasticity of demand: price, income and cross elasticity of demand.

Demand estimation: development of model, data collection, choice of functional form, estimation and interpretations using regression techniques. Problems with regression analysis: Omitted variables, identification and Multi-co linearity.

Production theory: Production function, short run production and law of diminishing returns, long run production, least cost factor combination, expansion path, returns to scale, economies of scale and scope, estimation of production function.

Cost theory: The economic concept of cost, short and long-run cost function, marginal and average costs, profit contribution analysis; operation leverage and estimation of cost function.

Profit maximization under different market structure: market structures, perfect competition, monopoly, monopolistic competition, oligopoly, profit maximization in short and long runs, evaluation of markets.



Pricing decisions: Pricing of goods and services, price discrimination, pricing of multiple products, product bundling, peak-load pricing, cost plus pricing, pricing of inputs, pricing under different market structures, economic rent, labour unions, minimum wages laws.

Decision making under uncertainty: The concept of risk and uncertainty, risk and decision making, adjusting business decision for risk, decision tree analysis.

Recommended Text(s):

Managerial Economics- Peterson H. Craig & Lewis W. Cris; Fourth Edition, PEARSON Education

Managerial Economics- Mark Hirschey and James L. Pappas

Managerial Economics- James R. McGuigan & R. Charles Moyer (Eighth Edition).



Marine Internal Combustion Engines-I

Course Code : ME 1111
Credits : 3.0
Contact Hours : 42
Assessment : Written Examination, Class tests
Faculty in Charge:

Aims:

To provide an understanding on the basic concepts, working principles and processes of marine internal combustion engines.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- 4-stroke and 2-stroke engine working principle
- Engine fuel oil, lubricating oil and cooling system
- Safety devices in engines
- Calculation of engine power

Syllabus Contents:

Heat-engine cycle
Ideal-gas cycle

Diesel Engine Cycle: 4 stroke and 2-Stroke cycles; Deviation from ideal Condition in actual engines; Limitation in parameters, Timing Diagrams of 2-stroke and 4-stroke engines. General Description of I.C. Engines; Marine Diesel Engine of M.A.N. B&W, Sulzer, makes etc. Comparative study of slow speed, medium speed and high speed diesel engines suitability and requirements for various purposes.

Cooling of I.C. Engines: Various cooling media used; their merits and demerits, cooling of pistons, cylinder heads, coolant conveying mechanism and systems, maintenance of coolant and cooling system

Fuel oil system of IC engines: IC engine fuel oil supply and circulation system from fuel oil tanks to engines.

Lubrication Systems: Lubrication arrangement in diesel engines including Coolers & filters
Cylinder, Lubrication, Liner wear mechanism and preventive measures, combinations of lubricating oil its effect and preventive measures.

Safety and Prevention of mishaps in I.C. Engines: Causes and prevention of crank-case explosion, and Scavenge fires. Detection of same and safety fittings provided to prevent damage. Starting air line explosion.

Indicator diagrams; and power calculations: Construction details of indicator instrument. Significance of diagram Power Calculations, fault detection, simple draw cards and out of phase diagrams. Power balancing, Performance characteristic Curves, Test bed and Sea trials of diesel engines.

Vibration and Balancing:



Fluctuation of energy, Purpose of the flywheel, Simple harmonic motion, static balance and dynamic balance, critical speed and bared speed range, operation of vibration damper.

Recommended Text(s):

Morton, TD Motor Engineering Knowledge for Marine Engineers. London.

Thomas Reed Publications Ltd, 1994 (ISBN 09-01-2856-5).

A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemaan.

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemaan.

Workshop Process and Materials



Course Code : ME 1113
Credits : 3.0
Contact Hours : 42
Assessment : Written Examination, Class tests
Faculty in Charge :

Aims:

To provide the theoretical knowledge to support the use of hand, power and machine tools and measuring instruments that is required in marine engineering maintenance.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- The use of common workshop tools;
- The use of machine tools and machine process;
- The use of measuring instruments;
- Fitting and overhauling of machines; and
- Safety measures in workshop process.

Syllabus Contents:

Common workshop tools: Description and uses of different types of calipers, Straight edges, try squares, vices, Hammers, chisels, Scrapers, files, Drills, reamers, Tapes, V-Blocks, face plate, Marking blocks, Carpentry tools, Pattern maker's tools, smithy tools Molding tools.

Machine process & Machine Tools: The geometry of cutting processes machines of cutting, chip formation, cutting forces and power, Friction of chip on tools Generation and dissipation of heat in cutting. Standard nomenclature for cutting tools. Cutting speeds and feeds, estimation of machining time. The fundamental Cutting process. Application in hand tools as chisel, file and saw, geometrical control of the cutting edge. Kinematic analysis, specification, operation and inspection of the more important types of metal cutting machine tools including Centre lathes, Capstan and turret lathes, Automatic lathes, drilling and boring machines Shaping slotting and planning machines, Milling and broaching machines. Turning, Screw cutting and taper turning processes on Centre lathe, Abrasive process, Grinding, honing and lapping by hand and machines Shears and punches. Wood working machines. Principles of jigs and fixtures Standardization.

Measuring Instruments & Inspection: Description and use of steel rule, Vernier's scale, Micrometer, Dial gauge, Depth gauge, thread gauge, Feeler gauge, Wire Gauge, pattern maker's scale, Taper gauge, snap gauge, plug gauge, Optical methods of measurement, Principles of interchangeability, limit system. Use of limit gauge.



Fitting and Overhauling: Types of packing and jointing materials and their uses. Design considerations and construction of various types of valves and cocks, Reducing valves for steam and air. Bedding of bearings, marking of engine parts for fitting, machining operations fitting of keys cotters, etc.

Safety Measures: Sources of danger and methods of protection. Types of guards and safety devices, factory Act regulations.

Recommended text(s):

Bruce J. Black(1982), Workshop processes, practices and materials
Pritchard, R.T. Technician Workshop Processes and Materials. London, Hodder
and Stoughton, 1979



Ship Structure and Construction

Course Code : ME 1115
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes used in the ship construction.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Construction features of different types of ships.

Effects of various static and dynamic forces on ships structure.

Sections and materials used in ship construction

Framing system, shell and deck plating arrangement, forward and aft end arrangement.

Syllabus Contents:

Ships Terms: Various terms used in ship Construction with reference to Ship's parameter e.g. L.B.P. Moulded Depth, Moulded draught etc. General Classification of Ships.

Stresses in Ship's structure: Hogging, Sagging, Racking, Pounding, Panting, etc. and Strength members to counteract the same.

Sections and materials use: Type of section like Angles, Bulb Plates. Flanged beams used in ship construction. Riveting & Welding. Testing of welds. Fabricated components.

Bottom & side Framing: Double bottoms, Water tight floors, Solid and bracket floors, Longitudinal framing keels, side framing like Tank side brackets, Beam knee, Web Frame, etc.

Shell & Decks: Planting system for shells, Deck plating & Deck girders, discontinuities like hatches and other openings. Supporting & closing arrangements, mid-ship Section of ships.

Bulk heads & Deep Tanks: Water tight bulkheads, Arrangements of plating and stiffeners. Water tight openings through bulkheads for electric cables pipes and shafting. Deep tank for oil fuel or oil cargo corrugated bulk heads.

Fore-End Arrangements: Stem construction. Arrangement to resist panting, panting stringers, Forepeak-Collision bulk heads Bulbous bows. Anchor and cable arrangements.

After-End-Arrangements: Stem construction. Arrangements to resist panting, panting stringers, Forepeak-Collision bulk heads. Bulbous bows. Anchor and cable arrangements.



Recommended Text(s):

E.A Stokoe (1985), Ship construction for marine engineers.

Taylor, D.A. (Dr.) Merchant Ship Construction, 4th ed. London, Institute of Marine Engineers, 1998 (ISBN 0-408-01535-7)



Basic Electro-Technology

Course Code	: ME 1117
Credits	: 3.0
Contact Hours	: 42
Assessment	: Term end written examination, class tests
Faculty in charge	:

Aims:

To provide students with the theoretical knowledge on the fundamentals of marine electrical practice.

Learning Outcomes:

The student will learn about 'Basic Electro-Technology' in regards to comprehensive idea of circuit variables and elements, simple resistive circuits, techniques of circuit analysis, network theorems, maximum power theorem, energy storage elements, magnetic quantities and magnetic circuits.

Syllabus Contents:

Circuit variables and elements: Voltage, current, power, energy, independent and dependent sources, and resistance, Kirchhoff's current and voltage laws. Ammeter, Voltmeter, Wattmeter & Other meters.

Simple resistive circuits: Series and parallel circuits, voltage and current division, wye-delta transformation

Techniques of circuit analysis: Mesh and node circuit analysis including super node and super mesh. Reduction of complicated networks.

Network theorems: Source transformation, Thevenin's, Norton's, Superposition and Millman's theorems with applications in circuits having independent and dependent sources.

Energy storage elements: Inductors and capacitors, series parallel combination of inductors and capacitors. Responses of RL and RC circuits: Natural and step responses.

Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential.

Sinusoidal functions: AC theory, instantaneous current, voltage, power, effective current and voltage, average power, Use of complex quantities in AC circuits.

Phasors and complex quantities: Impedance, real and reactive power, power factor, Vector diagram.

Analysis of single-phase AC circuits: Series and parallel RL and RC circuits. nodal and mesh analysis.

Poly-phase systems: The three phase generator, The Y-connected generator and load, the Y-Delta system, The Delta connected generator and load, Delta-Delta and Delta-Wye three phase system.



Balanced and unbalanced three phase circuit analysis: The three and two wattmeter methods, Unbalanced three –phase four-wire Y-connected load.

Recommended Texts:

Alexander &Sadiku :Fundamental of Electric Circuits

Kerchner& Corcoran : Alternating Current Circuits, 4th Edition

R.L.Boylestad : Introductory Circuit Theory, Prentice-Hall India Pvt. Ltd.

Arthur Morly and Edward Hughes, Principles of Electricity, 3rd edition, Publisher:
Longman, London and Newrork



English Sessional

Course Code : ME 1102
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To enhance the students' English reading, writing, listening and speaking skills so as to ensure effective communication in a multi-cultural environment.

Learning Outcomes:

After completion of this course, students should:

- Develop full range of reading skills;
- Develop full range of listening skills;
- Develop full range of writing skills; and
- Develop full range of speaking skills

Syllabus Contents:

Reading: Skimming, Scanning, Reading for general information; Reading for specific information; Distinguish between important information and unimportant information; Distinguish between factual information and non-factual information; Understanding explicit information and implicit information; Comprehension based on selected short stories.

Writing: Sentence structure; Vocabulary and diction; Presenting ideas in an organized way; Knowledge on genre based writing; Writing Paragraph and essay; Writing formal letters (tender, quotation, sales letter, letter of complaint, adjustment letter, writing in print media); Writing different types of reports.

Listening: Predicting, understanding native speaker's English from audio and video; Listening for correct pronunciation through audio and video; Distinguish between important and unimportant information during listening; Listening to recorded text for understanding main idea, specific information, speaker's point of view.

Speaking: Organizing information into coherent structure; Narrating events in structured way; Effective presentation; Participation in debate and dialogue.

Recommended Text(s):

- Michael A. Pyle- TOEFL Preparation guide
- Cambridge IELTS Preparation guide



Basic Electro-Technology Sessional

Course Code : ME 1118
Credits : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

The students will perform experiments to verify practically the theories learned in the course 'Basic Electro-Technology'.

Learning Outcomes:

Students will gain hands on experience on 'Basic Electro-technology' in regards to comprehensive idea of circuit variables and elements, simple resistive circuits, techniques of circuit analysis, network theorems, maximum power theorem, energy storage elements, magnetic quantities and magnetic circuits

List of Experiments:

- Introduction to Multi-meter.
- Color Code of Resistor.
- Verification of Ohm's Law.
- Verification of Kirchhoff's Current Law.
- Verification of Kirchhoff's Voltage Law.
- Study of Voltage and Current Divider Rule
- Study of Super Position Theorem in Circuit Analysis
- Familiarization with the electrical circuit Components
- Determination of frequency response of an R-C series circuit
- Determination of resonance frequency of an R-L-C series circuit.
- Measurement of power and power factor in a single phase circuit
- Measurement of single phase power using a wattmeter.
- Measurement of balance three phase power by one wattmeter method
- Study of the relation between line current and phase current of delta connected load.
- Study of the relation between line Voltage and phase Voltage of Y-connected load.
- Determination of phase sequence.

Recommended Text(s):

- Laboratory Manual for AC Electrical Circuits by James M. Fiore, Version 1.2.1
- Introduction to Electric Circuits: Lab Manual 9th Edition, By Brian Kelly



Computer Fundamentals and Applications

Course Code : ME 1120
Credit : 1.0
Contact Hours : 2 per week
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in charge:

Aims:

To provide the basic knowledge on computer operation, networking and trouble shooting.

Learning Outcomes:

After successful completion of this course, the students will be able to:

- Identify computer hardware and peripheral devices
- Be familiar with software applications, understand file management
- Accomplish creating basic documents, worksheets, presentations and databases
- Experience working with email and recognize email netiquette, Explore the Web and how to conduct research, Identify computer risks and safety.

Syllabus Contents:

Introduction to computer: What is Computer, Computer types, History and generation of computer, Specification of computer

Hardware Components: Basis organization and functional units of computer- input devices, central processing unit, memory unit, basics of microprocessor

Number system and Code: binary , octal, decimal and hexa decimal numbers, conversion between different number system, Binary arithmetic, BCD and ASCII codes, integers and floating number representation.

Logic gates and Boolean algebra: Different types of gates and their truth tables, Boolean algebra, de- morgan's theorem

Software components: Types of software, system software, introducing computer languages, machine language, assembly language, system utilities, Application software

Operating system: Introduction, function and types of operating system, examples operating system DOS, Windows, Windown NT, LINAX etc.

Office automation: Goals of office automation, characteristics of office and office automation system, obstacle to the growth of office automation, trends in office automation, Office automation tools and technology.

Word processing and Excel

GNUPLLOT

Recommended Text(s):

- C.S. France : Computer Science
- Warford : Computer Science
- Norton: Inside PC.



Hand and Power Tools Sessional

Course Code : ME 1122
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide the students with sufficient practical skill on the use of hand and power tools as required on board to perform the duties of an operational level engineer officer.

Learning Outcomes:

After successful completion of this course, trainees will possess sufficient skill and knowledge in the use of hand and power tools to carry out and/or supervise the work normally encountered as maintenance or repair work on board ship. Trainees will be able to select and use the correct tools in any given situation and carry out the necessary maintenance to ensure that they are kept in good order and ready for use.

Syllabus Contents:

Orientation of hand held engineering tools including bench vice, different types of files; screw drivers; centre punch; hammer; hacksaw frame and blade; dividers; slide callipers etc.
Preparation of a square bar from mild steel plate as per given dimensions.
Preparation of a drill drift using hand held engineering tools.
Preparation of a chisel from MS rod using different engineering tools.
Preparation of chipping hammer from MS plate using different engineering tools
Preparation of a fitting fixing from MS plate using different engineering tools.

Recommended Text(s):

Bruce J. Black(1982), Workshop processes, practices and materials
Pritchard, R.T. Technician Workshop Processes and Materials. London, Hodder
and Stoughton, 1979 (ISBN 0-34022-100-3)



Section: 4

Course Description: 1st Year 2nd Term

Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)



Physics-II

Course Code : ME 1201
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class test
Faculty in Charge :

Aims:

To provide an understanding on the concepts, principles and processes of applied science in the particular field of waves and oscillations, geometrical optics, and wave mechanics.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Mathematical wave equation
- Optical modulation and detection
- Wave function.

Syllabus Contents:

1. Waves & Oscillations:

Differential equation of a simple harmonic oscillator, Total energy and average energy, Combination of simple harmonic oscillations, Lissajous figures, Spring-mass system, Calculation of time period of torsional pendulum, Damped oscillation, Determination of damping coefficient, Forced oscillation, Resonance, Two-body oscillations, reduced mass, Differential equation of a progressive wave, Power and intensity of wave motion, Stationary wave, Group velocity and phase velocity, Architectural acoustics, Reverberation and Sabine's formula.

2. Geometrical Optics:

Combination of lenses: Equivalent lens and equivalent focus length, Cardinal points of a lens, Power of a lens; Defects of images: Spherical aberration, Astigmatism, Coma, Distortion, Curvature, Chromatic aberration; Optical Instruments: Compound microscope, Polarizing microscope, Resolving power of a microscope, Camera and photographic techniques.

3. Wave Mechanics:

Principles of statistical physics, Probabilities, Classical statistics, Quantum statistics, Bose-Einstein statistics, Fermi-Dirac statistics and their applications, Fundamental postulates of wave mechanics, Time dependent Schrodinger equation, Schrodinger equation for one-electron atom and its solution.

Recommended Text(s):



Waves and Oscillation, N. Subrahmanyam Brijlal, Publisher: Vani Educational Book.

Physics for Engineers, Dr. Giasuddin.

A text book of Optics, Dr. N. Subrahmanyam, Brijlal and Dr. M.N Avadhanulu, 2015,

Applied Physics - J.H. Clough - Smith

2. Fundamental of Physics - M.Nelkon

3. Principles of Physics - Fredrick J. Bueche

4. Physics: Classical & Modern - Gettys , Keller , Skove

5. University Physics - Young , Sears and Zemansky



Mathematics- II

Course Code : ME 1203
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes used in differential and integral calculus, differential equations and co-ordinate geometry in order to carry out any calculations required in the courses leading to the operation and management level certificate of competency or any other higher study in the maritime domain.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Differential Calculus problems relevant to Differential Co-efficient, Successive differentiation, Partial Differentiation, Curve Tracing, Maxima and Minima, and Tangent and Normal
Integral Calculus problem relevant to Indefinite Integrals and Definite Integrals
Ordinary differential equations and liner differential equations.
Co-ordinate geometry.

Syllabus Contents:

Differential Calculus:

Differential Co-efficient
Successive differentiation
Partial Differentiation
Curve Tracing
Maxima and Minima
Tangent and Normal

Integral Calculus:

Indefinite Integrals
Definite Integrals

Differential Equations:

Ordinary differential equations of first order and first degree: Variables separable, Homogenous equations, Equation reducible to homogeneous form, exact differential equations, the linear equations
Linear differential equations with constant co-efficient, and Inverse Operator



Co-ordinate Geometry:

Pair of Straight Lines; General equations of second degree; the tangents and normal on the curves.

Co- ordinates of three dimensions; Direction cosines and ratios, plane.

Recommended Text(s):

B.C Das and B.N Mukherjee, 2012, Differential Calculus, 51st edition, Publisher: U.N Dhur & Sons Private Ltd.

B.C Das and B.N Mukherjee, 2012, Integral Calculus, 54th edition, Publisher: U.N Dhur & Sons Private Ltd.

Elements of Applied Mathematics – Vol: I - Wartikar P.N. & Wartikar J.N.

Text book of Applied Mathematics – Vol: II - Wartikar P.N. & Wartikar J.N.

Vector Algebra - Shanti Narayan

Vector Calculus - Shanti Narayan

Differential Calculus - Shanti Narayan

Engineering Mathematics - Bali Saxena Iyengar

Plane Trigonometry - Loney S.L.



Accounting and Finance

Course Code : ME 1205
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To familiarize the students with the theoretical concepts, principles, guidelines, accounting standards and their practices in the business and non-business organizations. This course will also focus on the basics of financial management.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Accounting and its environment, recording process, preparation of balance sheet, income statement and accounting of inventories, plant assets and temporary investments.

Financial environment, risk and returns, managing current assets and time value of money.

Syllabus Contents:

Accounting:

Accounting and its environment: introduction, definition, activities use and users of accounting information; and generally accepted accounting principles, accounting system, challenges of accounting, principles of accounting: Transaction, accounts and its classification.

Recording process: Identification of debit and credit sides of transaction, and features of double entry accounting system. Accounting equation and transaction analysis in accounting equation. Journal: definition and classification of journal, recording transaction in the journal; Ledger: Definition, classification and preparation of journal; Trial balance: Definition, features, methods of preparation.

Measuring business income: Basis of accounting: Cash basis and accrual basis, importance of measuring and reporting income, and nature of income different approaches; reporting income-the income statement and reporting changes in retained earnings.

Completing the accounting cycle: Accounting cycle, worksheet: definition, steps in preparing worksheet, preparing financial statement from a worksheet; closing the books: closing entries, posting closing entries, and preparing post closing trial balance; Summary of accounting cycle: revising entries, and correcting entries, and preparation of worksheet.



Accounting for merchandising operations: Definition and operating cycle, and recording the purchases and sales of merchandise; forms of financial statement and preparation of financial statements.

Accounting for inventories: Definition and classification, and determining different inventory levels/quantities; inventory costing: methods of pricing and practice; financial statement effects; income statement effects, balance sheet effects and tax effects.

Accounting for plant assets: Definition and class of plant assets, and determination of cost of plant assets; Depreciation: definition and methods of charging depreciation; accounting for depreciation.

Bank reconciliation statement: Definition, needs, causes of differences and reconciliation procedure; Practice: Preparation of reconciliation statement and adjusting entries.

Accounting for temporary investments: Definition and reporting criteria, recording purchase and sale of marketable securities, and valuation of marketable securities; Practice: Valuation and accounting for marketable and debt securities.

Finance:

Financial Environment: Institution, markets, and interest rates; money market; capital market; investment banks, financial intermediaries; determinants of interest rate, term structure of interest rates.

Source of Finance: Short, medium and long term sources of finance.

Risk and return: Concept, risk and rate of return, stand alone risk, portfolio risk, the concept of beta, security market line.

Managing current assets: Alternative working capital policies, cash management, inventory management, accounts receivable management.

Time value of money: Present value, future value, annuities, ordinary annuities, annuities due, present value of annuities, future value of annuities.

Capital Structure theories: Concept, determinant, theories-net income approach, net operating income approach.

Cost of capital: Concept, component costs, cost of debt, cost of preferred stock, cost of retained earnings, cost of new equity.

The basics of capital budgeting: Types of capital projects, evaluation of capital projects, pay-back period, discounted pay back, NPV-IRR-MIRR-issues in capital budgeting.

Dividend policy: Concept, determinant factor, theories, bird in the hand theory-tax preference theory, middle of the road theory, clientele effects.

Recommended Text(s):

Accounting principles, 9th edition, Wwygandt, Keiso and Kismel

Intermediate accounting-8th edition, with manual, Smith and Skousen.

Fundamentals of Financial management- Eugene F. Brigham and Joel F. Houston.

Principle of managerial Finance, Lawrence J. Gitman



Basic Maritime Safety and Security

Course Code : ME 1207
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination, Class test
Faculty in Charge :

Aims:

To provide the basic training on the safety and security to the students in order to fulfill the mandatory minimum requirements to join ocean going vessel.

Learning Outcomes:

The students will gain theoretical knowledge on Fire Prevention and Fire Fighting, Personal Survival Technique, Personal Safety and Social Responsibility, Elementary First Aid, Security Awareness Training, Designated Security Duties and will be in a position to apply such knowledge if deemed necessary.

Syllabus Contents:

Fire Prevention and Fire Fighting

- Introductions to safety and principles
- Concept and application of the fire triangle to fire and Explosion
- Types and sources of ignition
- Fire hazards, Organization of shipboard fire fighting
- Location of fire-fighting appliances and emergency escape routes
- Fire spread in different parts of a ship
- Fire and smoke detection measures on ships and automatic alarm systems
- Selection of fire-fighting appliances and equipment
- Precautions for and use of fixed installations
- Use of breathing apparatus for fighting fires and effecting rescues

Personal Survival Technique

- Introduction to safety and survival
- Emergency situations
- Evacuation
- Survival craft and rescue boats
- Personal life-saving appliances (demonstrations)
- Survival at sea
- Emergency radio equipment
- Helicopter assistance



Personal Safety and Social Responsibility

- Observe safe working practices
- Team building
- Understand orders and be understood in relation to shipboard duties
- Comply with emergency procedures
- Take precautions to prevent pollution of the marine environment
- Contribute to effective human relationships on board ship – social responsibilities

Elementary First Aid

- General Principles
- Body Structure and Functions
- Positioning of Casualty
- The Unconscious Casualty
- Resuscitation
- Bleeding
- Management of Shock
- Burns and Scalds, and Accidents Caused by Electricity
- Rescue and Transport of Casualty
- Bandaging
- Infectious diseases
- Personal health and hygiene

Security Awareness Training

- Introduction to security awareness
- Marine Security Policy
- Security Responsibilities
- Threat Identification, Recognition and Response
- Vessel Security actions
- Emergency Preparedness, Drills and Exercises

Designated Security Duties

- Introduction to designated security
- Marine Security Policy
- Security Responsibilities
- Ship Security Assessment
- Security Equipment
- Threat Identification, Recognition, and Response
- Ship Security Actions
- Emergency Preparedness, Drills, and exercises
- Security Administration

Recommended Text(s):

1. Seamanship Technique- DJ House



Illustrated Seamanship- Dedekam
Nocholl's Seamanship & Nautical Knowledge- A.N.Cockroft
Seamanship notes – Angus Ferguson
American Merchant Seaman's manual – William B.Hayler
Basic Seamanship – Clossold revised by Miller
Theory and Practice of seamanship – Graham Danton
Knight's modern seamanship- John Noel
IMO Model Course : 1.20, 1.13, 1.19, 3.26, 3.27, 1.21
Seamanship notes – Kemp & Young
Lifeboat and Life Raft – S.K. Puri
Survival at Sea – C.H.Wright

Maritime Legislation



Course Code : ME 1209
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a foundation for the appreciation of the complex body of maritime law, and knowledge of the major maritime international conventions.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- The basic principles of maritime law within the wider context of law and legal systems
- The basics of public international law, including law of the sea and the law of treaties
- Various IMO conventions

Syllabus Contents:

Introduction to Maritime Law: Law and legal systems; Principles of public international law, International Maritime Organization; Maritime administration.

Law of the Sea: Conventions on the Law of the Sea, Territorial Sea and the Contiguous Zone, International Straits, Exclusive Economic Zone and Continental Shelf, High Seas, Protection and Preservation of the Marine Environment
International Convention on Load Lines, 1966 (LL 1966), as amended;

International Convention for the Safety of Life at Sea, 1974 as amended (SOLAS):
General Provisions, Subdivision and Stability, Machinery and Electrical Installation, Fire Protection, Fire Detection and Fire Extinction, Life-Saving Appliances and Arrangements, Radio-communications, Carriage of Grain, Carriage of Dangerous Goods.

The International Safety Management (ISM) Code

International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978 as amended.

ITU Radio Regulations

Special Trade Passenger Ships Agreement, 1971, and Rules, 1971(STP 1971)

Protocol and Rules on Space Requirements for Special Trade Passenger Ships, 1973 (SPACE STP 1973)

Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL 1974).

International Convention on Tonnage Measurement of Ships, 1969

International Convention for the Control and Management of Ship's Ballast Water and Sediments, 2004

Recommended Text(s):

1. Grime, R. (1991). *Shipping Law* (2nd ed.). London: Sweet & Maxwell Ltd.



Hill, C. *Maritime Law*, (6th ed.) LLP, London
IMO: SOLAS Consolidated Edition 2009. London: IMO
IMO: STCW 1978 Edition 2011. London: IMO
UNCLOS (1982), UN, New York

Marine Internal Combustion Engines-II



Course Code : ME 1211
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide a foundation for the appreciation of working principles, components, maintenance and trouble shooting of large-bore, 2-stroke marine diesel engines running at low speed, normally using direct drive, fitted with piston rods and guides.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Construction and operational principles of 2- stroke marine diesel engine components.
- Maintenance and repair of 2-stroke marine diesel engines.
- Performance monitoring and trouble shooting of 2-stroke marine diesel engines.
- Modern trends of 2-stroke marine diesel engines.

Syllabus Contents:

Basic Construction of large-bore two-stroke engines: Discussion on the major components of large bore marine diesel engines including the bedplate, a main bearing, an 'A' frame and entablature, guides, a liner, cooling-water jacket, a cylinder head, diaphragm, turbocharger, scavenge trunk, air cooler, crankshaft, connecting rod, crosshead, piston, bottom end bearing, top end bearing, camshaft, push rod, rocker, exhaust valve or port, air-inlet port, chain or gear train driving the camshaft.

Maintenance of diesel engines : Inspection and replacement of various Component members such as Piston ring, Cylinder head, Liner, Bearings, Driving chain and gears etc. crankshaft deflection and alignment. Engine holding down arrangements, Trouble shooting in diesel engine.

Modern trends in development: Current Engines (Sulzer RTA, B&W CMC& SMC, SEMT Pielstik), Intelligent Engine (Camless concept), improvement in design for increased TBO. U.M.S. Operations of ships.

Recommended Text(s):

- Morton, TD Motor Engineering Knowledge for Marine Engineers, 1999, London: Thomas Reed Publications Ltd.
- D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth
- A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemaan.

Marine Boilers and Steam Engineering



Course Code : ME 1213
Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge:

Aims:

To provide the competences concerned with the operation, maintenance and trouble shooting of steam boilers problems

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Marine Boiler Construction
- Boiler Mountings and Steam Distribution
- Marine Boiler Operation
- Steam Boiler Fuel Atomization and Combustion
- Steam turbine
- Boiler water treatment

Syllabus Contents:

General Considerations governing the design of Boilers: Types of marine boilers, comparison of smoke tube and water boilers; Destructive and Non destructive tests on plates, rivets, welded seams, classification society requirements for boilers construction.

Smoke Tube Boilers: Various types in marine use, Principal dimensions and staying of flat surface of multi-tubular cylindrical Boilers. Vertical Auxiliary Boilers.

Water Tube Boilers: General description with sketches of principal types of boilers in marine use, Super-heater, Economizer, Air pre-heater & steam pre-heater; circulation and use of Unheated Down comers in highly rated boilers; Superheat temperature control, Attemperators and De-superheaters.

Waster heat boilers: Waste heat recovery calculation, Lamont exhaust gas boiler. Scotch composite Boiler, Cochran exhaust gas and composite boiler, spanner marine exhaust gas and Composite boiler. Forced Water Circulation boiler, Double evaporation Boiler.

Boiler Mountings: Safety Valves- Improved High Lift, Full lift and full Bore type: Gauge glass- Ordinary plate type and remote Indicator; Automatic feed regulator, three element High & Low water level alarms, Main Steam stop valves, Retractable type Soot blower etc.



Operation, Care & Maintenance: Pre-commissioning procedures, Hydraulic, steam raising and operating procedures, Action in the event of storage of water. Blowing down of boiler, laying up a boiler; General maintenance. External and internal tube cleaning. Tube renewals, etc. maintenance, inspection and survey of boilers.

Refractory: Purposes of refractory, types of refractory and reasons for.

Oil burning: Procedure of Liquid fuel burning in open furnace, Various types of atomizer, Furnace arrangement for oil burning, Boiler Control System i.e. master control, fuel control, air control and viscosity control.

Boiler and Associated Auxiliaries, and Steam Systems: precautions and necessary measures to be taken when getting up steam, soot blow including the function of soot blowers, malfunctions /troubles likely happen to boiler on its operation, precautions for opening high temperature steam valves, how to keep boiler in cold condition while it is out of service, correct procedures for operating steaming boilers in parallel on load, the correct procedures for checking the water level in steaming boilers, the danger of oil entering a boiler with the feed-water, what is meant by "blow-back", how blow-back can be avoided, the need for, and the use of, soot blowers, why the temperature of boiler exhaust gases should be maintained above a minimum value

Boiler Maintenance: the need for cleaning the fire side of a boiler and how to do it, how to inspect the fire side of a boiler and repair/maintenance, the need of cleaning up the water side of a boiler and how to do it, how to inspect the water side of a boiler and the repair/maintenance

Boiler water treatment: Fundamentals; Acidity/Alkalinity; corrosion; Water testing and treatment; effects of salts and gases in feed water;

Marine Steam Turbine: Rankine cycle; Basic construction; Operation principles; the impulse turbine; the reaction turbine; Force on blades.

Recommended Text(s):

Morton, TD Motor Engineering Knowledge for Marine Engineers. London.

Thomas Reed Publications Ltd, 1994.

Jackson L. and Morton T.D (1999), Reed's General Engineering Knowledge for Marine Engineers.

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Pump and Pumping Technology

Course Code : ME 1215



Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide a foundation for the appreciation of technical aspects of the operation, maintenance and trouble shooting of pump and associated systems that includes evaporators and distillers, heat exchangers and condensers.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Principles of Pumping and types of pumps
- Construction, operation, maintenance and trouble shooting of distillers
- Construction, operation, maintenance and trouble shooting of heat-exchangers.

Syllabus Contents:

Piping arrangement: Layout of main and auxiliary machinery in engine room, arrangements of steam, bilge, ballast and oil fuel systems, Lub oil and Cooling system with various fittings. Domestic fresh water and sea water hydrophore system.

Pumps: Types of pumps for various requirements, their characteristics and application in ships. Centrifugal, Gear Pumps, Screw pumps and Reciprocating pumps. Care and Maintenance of pumps.

Operation of pumping system: Routine Pumping Operations; Operation of Bilge, Ballast and Cargo Pumping Systems

Evaporators and distillers: Construction and Operation of different types of evaporators. Fresh Water generators. Conditioning arrangements of distilled water for drinking purpose.

Heat Exchangers: tubular and plate type, reasons of corrosion, tube removal, plugging, and materials used.

Condensers: Shapes and types of condensers, constructional details, location & method of securing, working principles, contraction and expansion allowances, leak test. Effect - change of temperature, circulating water quantity, condenser surface.

Recommended Text(s)

Jackson, L and Morton, T.D. General Engineering Knowledge for Marine Engineers.
5th ed. London, Thomas Reed Publications Ltd 1990.

Taylor, D.A. Introduction to Marine Engineering. 2nd ed. London, Butterworth. 1990

H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Butterworth Heinemann

Basic Electronics



Course Code : ME 1217
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination, Class tests
Faculty in charge :

Aims:

To provide a foundation for the appreciation of the theories relating to electronic circuits and control equipment using electronic technologies.

Learning Outcomes:

After successful completion of this course, the students will learn '**Basic Electronics**' in regards to the working principle and characteristics of semiconductor diodes and transistors, BJT, MOSFET, Differential and multistage amplifiers.

Syllabus Contents:

Thermionic Emission and Valves: Conception of various types of Vacuum tubes.

P-N Junction as a Circuit Element: Intrinsic and extrinsic semiconductors, N and P type semiconductor, p-n junction and variation of potential barrier under forward and reverse bias, current-voltage characteristics of a PN junction diode.

Various diodes and Diode Circuits: Zener diode, Tunnel diode, Varactor diode, Thermistor, Simplified dc and ac diode models, dynamic resistance and capacitance. Half wave and full wave rectifiers, rectifiers with filter capacitor, Voltage regulators, Voltage doublers, Clippers and clampers.

Bipolar Junction Transistors: Working principle of PNP and NPN transistor, Transistor as an amplifier, Common base, Common-emitter and Common Collector Configurations, Input and output characteristics of CB,CE, and CC configuration, Load line analysis, Operating point. Performance of transistor operation, cutoff and saturation points

Single Stage Transistor Amplifier: Transistor biasing and stability factor, design of transistor biasing circuit, Small signal equivalent circuit and (both D.C and A.C) models, BJT as a switch. Single stage mid-band frequency BJT amplifier circuits: Voltage and Current gain, Power gain

Thyristor: Construction, working principle, characteristics, uses, disadvantages.

Field-Effect Transistors (FET): Construction and classification, Principle of operation, Characteristic curves, Channel conductivity, Channel ohmic and pinch-off region, Characteristic parameters of the FET, Effect of temperature on FET, Common source amplifier, Common drain amplifier.

Metal-oxide-semiconductor field-effect-transistor (MOSFET): MOSFET as circuit element, structure and physical operation of an enhancement MOSFET, threshold voltage, Body effect. Current- voltage characteristics of an enhancement MOSFET, biasing discrete and integrated MOS amplifier circuits.



Single-stage MOS amplifiers: MOSFET as a switch, CMOS inverter. Classification of MOSFET, UJT

Amplifiers: RC coupled amplifiers; power amplifiers; feed-back amplifiers; gain; band width.

Oscillators: LC oscillators (Hartley & Colpitt); RC oscillators (Phase shift).

Principle of radio communications: Modulation & Demodulation; sidebands; A.M transmitter; A.M radio receiver (Block study); superheterodyne receiver.

Recommended Text(s):

Robert L. Boylestad & Louis Nashelsky, Electronics devices and circuit theory
V.K.Mehta & A.K.Mehta, 2005, Principles of Electronics, Publisher: S. Chand and Company Ltd

B.L.Thereja & A.K.Thereja, Basic Electronics solid state
Elements of Electronics, 2000, M.K Bagde, S.P Singe and Kamal Singh: Publisher: S. Chand and Company Ltd

Physics Sessional



Course Code : ME 1202
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide practical understanding on the concepts, principles and processes of basic science in the particular field of structure of matter, electricity and magnetism, and modern physics.

Learning Outcomes:

Students will be able to verify practically the theories that are taught in physics theoretical subjects.

Syllabus Contents:

Group A:

Determination of 'g' by a compound pendulum
Determination of Young's modulus of elasticity of a string by Searle's apparatus.
Determination of rigidity modulus by static method.
Determination of surface tension of water by capillary tube method.
Determination of surface tension and angle of contact of Mercury by Quinke's method.
Determination of moment of inertia by fly-wheel about its axis of rotation.
Determination of co-efficient of viscosity of water by its flow through a capillary tube.
Determination of the thermal conductivity of a bad conductor by Lee's method.
To verify the laws of transverse vibration of stretched string with a sono-meter.
To find the frequency of tuning fork by Melde's experiment.

Group B:

Comparison of EMF of two cells.
Verification of the laws of combination of resistances by P.O box
Calibration of a meter bridge wire.
Determination of galvanometer resistance by half deflection method.
To determine electro-chemical equivalent of Copper/Silver.
Determination of the refractive index of prism material by spectrometer.
Determination of wave length of light by Newton's rings experiment.
Plotting the I-V characteristic curves for the forward biased and reverse biased P-N junction diode.
Plotting the input characteristic and output characteristic curves of a CE transistor circuit.
Construction of A.M radio transmitter and receiver



11. Construction of OR, AND, NOT gates and prove their truth table.

Recommended Text(s):

Introduction to the physics of matter, 2014, Nicola Manini, Publisher: Springer.
Electricity and magnetism, 3rd edition, Edward M. Purcell, David J. Morin, Publisher: Cambridge University Press.
Modern Physics, Jeremy Bernstein, Paul M. Fishbane, Stephen G. Gasiorwicz
Modern Physics for scientists and engineers, John Taylor, Chris Zafirator, Michael A. Dutson.
Fundamental of Physics, 10th edition, Halliday and Resnick, Publisher: Jearl Walker.
Properties of Matter, 2015, Brijlal and N. Subrahmanyam
Elements of Properties of Matter, 2007, D.S Mathur
Concept of Electricity and Magnetism, A.K Rafiquallah, Students Publications.

Basic Maritime Safety and Security Sessional



Course Code : ME 1208
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide the basic practical training on the safety and security to the students in order to fulfill the mandatory minimum requirements to join ocean going vessel.

Learning Outcomes:

The students will gain practical knowledge on Fire Prevention and Fire Fighting, Personal Survival Technique, Personal Safety and Social Responsibility, Elementary First Aid, Security Awareness Training, Designated Security Duties and will be in a position to apply such knowledge if deemed necessary.

Syllabus Contents:**Fire Prevention and Fire Fighting**

Drills and exercises relevant to organization of shipboard fire fighting, fire-fighting appliances and emergency escape routes, Fire spread in different parts of a ship, Fire and smoke detection measures on ships and automatic alarm systems, Selection of fire-fighting appliances and equipment, Precautions for and use of fixed installations, Use of breathing apparatus for fighting fires and effecting rescues.

Personal Survival Technique

Drills and exercises relevant to safety and survival, Emergency situations, Evacuation, Survival craft and rescue boats, Personal life-saving appliances, Survival at sea, Emergency radio equipment, Helicopter assistance.

Personal Safety and Social Responsibility

Drills and exercises relevant to safe working practices, Team building, shipboard duties, emergency procedures, precautions to prevent pollution of the marine environment, effective human relationships on board ship.

Elementary First Aid

Practical demonstration and application of first aid relevant to body structure and functions, positioning of casualty, Resuscitation, Bleeding, Management of Shock, Burns and Scalds, and Accidents Caused by Electricity, Rescue and Transport of Casualty, Bandaging, Infectious diseases, Personal health and hygiene.

Security Awareness Training



Drills and exercises on security responsibilities, threat identification, recognition and response and vessel security actions.

Designated Security Duties

Drills and exercises on security responsibilities, ship security assessment, security equipment, threat identification, recognition and response, ship security actions, emergency preparedness, security administration.

Recommended Text(s):

Seamanship Technique- DJ House
Illustrated Seamanship- Dedekam
Nocholl's Seamanship & Nautical Knowledge- A.N.Cockroft
Seamanship notes – Angus Ferguson
American Merchant Seaman's manual – William B.Hayler
Basic Seamanship – Clossold revised by Miller
Theory and Practice of seamanship – Graham Danton
Knight's modern seamanship- John Noel
IMO Model Course : 1.20, 1.13, 1.19, 3.26, 3.27, 1.21
Seamanship notes – Kemp & Young
Lifeboat and Life Raft – S.K. Puri
Survival at Sea – C.H.Wright

Basic Electronics Sessional

Course Code : ME 1218



Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a foundation for practical skills relating to electronic circuits and control equipment using electronic technologies.

Learning Outcomes:

The students will gain practical skills relating to electronic circuits by performing experiments to verify practically the theories and concepts develop in 'Basic Electronics'. The students will also learn to design simple systems using the principles learned in Basic Electronics.

List of Experiments:

- Study of the input and output characteristics of a transistor.
- Study of a single stage transistor amplifier and draw its frequency response curve.
- Study of lead identification and testing of diode, BJT and MOSFET
- Study of MOSFET as a switch.
- Study CMOS as an inverter logic.
- Study of the I-V characteristic curves of a diode.
- Design and construction of a half-wave rectifier circuit and calculation of ripple factor.
- Design and construction of a full- wave rectifier circuit and calculation of ripple factor.
- Study of clamper and clipper circuits and draw the output wave shape.
- Design and construction of a Voltage doublers circuits.
- Design and construction of a A stable, Bi-stable, Mono-stable multi-vibrator.

Recommended Text(s):

- Robert L. Boylestad & Louis Nashelsky, Electronics devices and circuit theory
- V.K.Mehta & A.K.Mehta, 2005, Principles of Electronics, Publisher: S. Chand and Company Ltd
- B.L.Thereja & A.K.Thereja, Basic Electronics solid state
- Elements of Electronics, 2000, M.K Bagde, S.P Singe and Kamal Singh: Publisher: S. Chand and Company Ltd

Maritime English and Communication Skill

Course Code : ME 1220



Credits : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide adequate knowledge on English that deals with maritime terminology and the use of English sufficient to allow the use of engineering publications and the performance of engineering duties concerned with the ship's safety and operation.

Learning Outcomes:

This course will:

- Enable trainees to master the English language related to marine engineering; develop trainees' ability to use engineering publications written in English and perform the engineer's duties;
- Ensure that trainees possess the knowledge, understanding and proficiency in English as set out in the STCW Code;
- Give trainees wide-ranging opportunities to practise communication in English for both maritime and general purposes; and
- Promote the study skills essential for continuing independent learning at sea

Syllabus Contents:

Adequate knowledge of the English language to use engineering publications:

- Use publications regarding main and auxiliary machinery and associated control systems
- Use publications regarding fuel, lubrication, bilge, ballast and other pumping systems and associated control systems
- Use publications regarding electrical, electronic and control systems
- Use publications regarding hand tools, machine tools and measuring instruments for fabrication and repair on board
- Use publications regarding pollution prevention requirements
- Use publications regarding seaworthiness of the ship
- Use publications regarding preventing, controlling and fighting fires on board
- Use publications regarding life-saving appliances
- Use publications regarding monitoring compliance with legislative requirements
- Use publications regarding personnel and ship safety

Adequate knowledge of the English language to perform engineering duties

- Use internal communication systems (
- English language associated with taking over and handing over a watch
- English language associated with keeping a watch and handing over a watch



English language associated with maintenance of the machinery space logs and the significance of the readings taken
English language of safety and emergency procedures
English language of application of leadership and team working skills
English language associated with Port State Control
English language associated with bunkering operation

Recommended Text(s)

Trenkner P., *IMO-Standard Marine Communication Phrases Audio Course for Upgrading VTS Operators*.
SMCP - Distress Urgency and Safety - Part 1 CBT#145. (Seagull, 2005)
Spincic A., *English Textbook for Marine Engineers I*. (Rijeka: Faculty of Maritime Studies, University of Rijeka, 2002)
Spincic. A, and Pritchard B., *English Textbook for Marine Engineers 2*. (Rijeka: Faculty of maritime Studies, University of Rijeka, 2009)



Section: 5

Course Description: 2nd Year 1st Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

Leadership and Principles of Management

Course Code : ME 2101
Credits : 2.0
Contact Hours : 28



Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide the students with the knowledge, skill and understanding of leadership, teamwork and management skills at the operational level on board a ship; to meet STCW requirements for the application of leadership and team working skills, in accordance with the 2010 Manila Amendments, specifically as stated in table A-II/1, A-III/1 and A-III/6.

Learning Outcomes:

This course will enable the students to have:

- Working knowledge of shipboard personnel management and training;
- A knowledge of related international maritime conventions and recommendations, and national legislation;
- Ability to apply task and workload management;
- Knowledge and ability to apply effective resource management; and
- Knowledge and ability to apply decision-making techniques

Syllabus Contents:

Introduction to Management Principles & Practice: Need for sound Management principles and Practice & growth of modern management through various Managerial Functions, Planning, Organizing, staffing, Directing, controlling & Co-ordination; Principles of locating a Plant & Developing Organization Structure. Various types of organizational structures; Authority & Responsibility. Boundaries of Authority.

Shipboard personnel management and training: Organization of crew, authority structure, responsibilities, cultural awareness, inherent traits, attitudes, behaviour, cross-cultural communication; shipboard situation, informal social structures on board; human error, situation awareness, automation awareness, complacency, boredom; leadership and team working; training, structured shipboard training programs; knowledge of personal abilities and behavioural characteristics.

International Maritime conventions and national legislation: International maritime conventions – SOLAS, MARPOL, STCW, and MLC, role of IMO, ILO; Recommendations and national legislation.

Task and workload management: Planning and coordination; personnel assignment; human limitations; personal abilities; time and resource constraints; prioritization; workloads, rest and fatigue; management (leadership) styles; challenges and responses.

Resource management: Effective communication on board and ashore; allocation, assignment and prioritization of resources; decision making reflecting team experience;



assertiveness and leadership, including motivation; obtaining and maintaining situational awareness; appraisal of work performance; short and long term strategies.

Decision-making techniques: situation and risk assessment; identify and consider generated options; selecting course of action; evaluation of outcome effectiveness; decision making and problem solving techniques; authority and assertiveness; judgement; emergencies and crowd management.

Personnel Management: The personnel function Requirement & role of psychological tests in recruitments; Training, performance appraisal and reward system, Legal requirements and regulation of working Condition, Employer's liabilities for health and safety, Leadership and Discipline, Motivation and incentives, Problems of Accident, Fatigue, etc., Relationship with Trade union and workers participation in management.

Recommended Text(s):

Management (9th edition), 2010, Stephen P. Robbins. Mary Coutler, Pearson education inc. publishing as prentice hall.

Armstrong, M. (2006). *Strategic Human Resource Management: A guide to action, Third edition*. Kogan page, London and Philadelphia.

Armstrong, M. (2012). *Armstrong's Handbook of Human Resource Management Practice (12th Edition)*. Kogan page: London, Philadelphia, New Delhi.

Computer Programming

Course Code : ME 2103

Credit : 2.0

Contact Hours : 28



Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide the students with an overview and training in C++ such that they can efficiently do programming related to scientific simulation in their master-degree projects.

Learning Outcomes:

After successful completion of this course, the students will achieve the following competences:

Familiarization with the universal concepts of computer programming.

To present the syntax and semantics of the “C”, “C++” language as well as basic data types offered by the language

Understanding the principles of the object-oriented model and its implementation in the C”, “C++” language

Understanding the means in resolving typical implementation problems with the help of standard C”, “C++” language libraries

Syllabus Contents:

Introduction to C and C++ programming languages

Identifiers and keywords, data types, variables, constants, operator and expressions, access modifiers, storage class specifies, type conversion in assignments.

C and C++ fundamentals – data types and expressions.

Operators. Libraries. Statements

Arrays and strings. Functions

Function overloading

Control statements. Pointers

Input and output systems

Oriented programming (OOP).

Application to the computations of stability, trim and structural strength of marine vehicles.

Recommended Text(s):

Teach Yourself C; Herbert Schildt

Teach Yourself C++; Herbert Schildt

The C programming language; B. Kernighan and D. Ritchie.

Marine Environment and Technology

Course Code : ME 2105

Credits : 3.0

Contact Hours : 42



Assessment : Term end written examination and class tests

Faculty in Charge :

Aims:

To provide a foundation for the appreciation of the major international conventions relating to marine environment and to discuss on the operation and maintenance of the anti-pollution equipment installed on board the vessel.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

The basics of public international law relating to Marine pollution, including MARPOL, London Dumping Convention, International Convention relating to intervention on the high seas in cases of oil pollution casualties, 1969, International Convention on civil liability for oil pollution damage, 1969.

Operation and maintenance of Oily water Separator, Sewage treatment plant, Incinerator, Oil discharge monitoring equipment etc.

Syllabus Contents:

International Convention for the Prevention of Pollution from Ships, 1973: Annex I: Regulations for the Prevention of Pollution by Oil, Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk, Annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form, Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships; Annex V: Regulations for the prevention of pollution by garbage from ships; Annex-VI: Regulations for the prevention of pollution of air from ships.

Convention of the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention).

International Convention relating to intervention on the high seas in cases of oil pollution casualties, 1969.

International Convention on civil liability for oil pollution damage, 1969.

Anti-pollution procedures and associated equipment: Basic knowledge of regulation 26 Annex 1 MARPOL 73/78; Basic knowledge of anti-pollution equipment required by national legislation.

Operation, maintenance and trouble shooting of antipollution machinery/equipment such as oily water separator, sewage treatment plant, incinerator, Oil discharge monitoring equipment etc.

Recommended Text(s):



IMO: MARPOL 73/78 Consolidated Edition 2011. London: IMO
Jackson, L and Morton, T.D. General Engineering Knowledge for Marine Engineers.
5th ed. London, Thomas Reed Publications Ltd 1990. (ISBN 09-47-63776-1)
H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher:
Butterworth Heinemann

Marine Internal Combustion Engines-III

Course Code : ME 2107
Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide in-depth knowledge on smaller bore, 4-stroke marine diesel engines running at medium- and high-speeds and fitted with trunk pistons.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Construction and operational principles of four stroke marine diesel engine components.

Maintenance and repair of 4-stroke marine diesel engines.

Performance monitoring and trouble shooting of 4-stroke marine diesel engines.

Syllabus Contents:

Medium and high-speed four-stroke Marine diesel engines: Engine components including bedplate, cylinder block, cylinder jacket, cylinder liner, cylinder head, exhaust gas manifold, air-inlet manifold, air cooler, engine crankcase, bearing housing and shell, lubrication-oil sump, piston, connecting rod, connecting rod bolts, gudgeon pin, crankshaft, camshaft and chain, push rods, fuel injector, air inlet and exhaust valves and rockers

Coupling and Gears: Engine couplings and reduction gears used in conjunction with medium speed engine, development in exhaust valve design, V-type engine details.

Maintenance: Maintenance, repair and overhauling of medium and high speed marine diesel engines.

Performance monitoring: Performance monitoring and trouble shooting of medium and high speed marine diesel engines.

Recommended text(s):

Morton, TD Motor Engineering Knowledge for Marine Engineers. London.

Thomas Reed Publications Ltd, 1994 (ISBN 09-01-2856-5)

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemann.

Shafting, Propeller and Steering Technology

Course Code : ME 2109
Credits : 2



Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding on the working principle, operation, maintenance and trouble-shooting on steering gear, shafting arrangement and propellers.

Syllabus contents:

Steering gears: Operation and Constructional details of various types of steering machinery. Tele-motor systems, transmitters and receivers Variable Delivery Pumps used in steering gears, axial and radial displacement types. Hunting action of Steering gear. Emergency Steering arrangement. Care and Maintenance of Steering gear plants.

Shafting: Methods of shaft alignment, constructional details and working of Thrust blocks. Intermediate shaft bearing and Stern tube bearing. Oil water lubricated stern Tubes. Sealing Glands. Stresses in Tail End, Intermediate and Thrust Shafts.

Propellers: Various types of propellers and their features, structure and materials for propellers, definition of propeller diameter, pitch, pitch ratio, boss ratio, pressure side, suction side, leading edge, following edge, blade section, blade rake, fixing of propeller on the propeller shaft, highly -skewed (skew back) propeller and its advantage, controllable pitch propeller (CCP) and its mechanism of changing blade angle, the advantages and disadvantages of a controllable pitch propeller in comparison with fixed pitch propeller (FPP), the cavitation of propellers and explains its generating mechanism, propeller singing and explains its generating mechanism and preventive measures.

4. Different types of ship stabilizer. Bow Thrusters

Recommended Text(s):

Jackson L. and Morton T.D (1999), Reed's General Engineering Knowledge for Marine Engineers.

H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Naval Architecture

Course Code : ME 2111
Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding of the geometry of ships & hydrostatic calculation with emphasis on stability of ships. Propulsion and rudder theory will also be addressed in this course.

Learning Outcomes:

After successful completion of this course, the participants will have sufficient knowledge on:
Maintaining the seaworthiness of the ship, including ship stability, carriage of cargoes on deck; heavy lifts, containers, bulk cargoes, grain, dangerous goods, oil tankers.
Theory and operation of Power, resistance, propulsion and propeller and rudder theory.

Syllabus Contents:

Geometry of ship & hydrostatic calculation: Ships lines, Displacement Calculation, First and Second moment of area, Simpsons rules, application to area and volume, Trapezoidal rule, mean and mid-ordinate rule, Tchebycheff's rule and their applications, Tonnes per Cm. Immersion. Coefficient of form, Wetted surface area, Similar figures. Centre of gravity, effect of addition and removal of masses, Effect of suspended mass.

Stability of Ships: Statical stability at small angles of heel, Calculation of B.M, Inclining experiment, Free surface effect, stability at large angles of heel, curves of statical stability, dynamical stability, angle of loll; stability of a wall sided ship, movement of centre of gravity, list and its correction.

Resistance & Power: Frictional, Residuary & Total resistance, Froude's Law of comparison, Effective power calculations, Ships correlation Factor (SCF), Admiralty coefficient, Fuel Coefficient and Fuel consumption. Effect of viscosity and application of ITTC formula.

Longitudinal Stability and trim: Longitudinal BM, Moment to change trim one Cm. Change of trim, change of L.C.B. with change of trim, Change of trim due to adding or deducting weights, alteration of draft due to change in density, Flooding calculations, Floodable length curves, M.O.T. method for determination of floodable lengths, factors of subdivision, Loss of stability due to grounding, Docking stability. Pressure on chocks.

Propulsion & Propellers: Definitions, apparent and real ship wake, thrust, relation between power, relation between mean pressure and speed, measurement of pitch, cavitations, propeller types, fixed pitch, Variable Pitch, ring propeller, Kort nozzles, Voith Schneider propeller, theory, Blade element theory, Law of similitude and model tests



with propellers, propulsion test, Geometry and geometrical properties of screw propellers, ship model correlation ship trials.

Rudder Theory: Action of the Rudder in turning a ship, force on rudder, Torque on stock, calculation of force torque on non-rectangular rudder, angle of heel due to force torque on rudder, Angle of heel when turning. Types of rudder, model experiments and turning trials, Area and shape of rudder, position of rudder, stern rudder Bow rudders.

Recommended Text(s)

Reed's Naval Architecture for Marine Engineers by E.A Stokoe

Bryan Barrass & Capt D R Derrett, Ship Stability for Masters and Mates, 6th ed.

Butterworth Heinemann, 2006 (ISBN-13:978-0-7506-6784-5, ISBN-10:0-7506-6784-2)

Applied Heat

Course Code : ME 2113



Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

This course aims to provide the knowledge of basic engineering science which is deemed to provide the depth of knowledge required by the Standards of Competence in Table A-III/1 of Section A-III/1 of the STCW'78 as amended in 2010 for a candidate for certification as officer in charge of an engineering watch.

Learning Outcomes:

On completion of this course, trainees will possess sufficient theoretical knowledge to carry out that part of a watch-keeping engineer's responsibilities concerned with the efficient operation of marine heat engines and thermodynamic process.

Syllabus Contents:

Thermodynamic properties

Heat transfer: Conduction, Convection and radiation; combined modes.

Ideal gases: Boyle's law; Charle's law; combination of Boyle's and Charle's laws; Characteristic equation; Dalton's law of partial equation; specific heats of gases; energy equation; enthalpy.

Energy changes

Thermodynamic System

Thermodynamic process, work transfer

Heat engine cycle: Four stroke diesel engine; Two stroke diesel engine, Petrol engines; Mean effective pressure and power; indicated power; brake power; mechanical efficiency; thermal efficiency; heat balance; clearance and stroke volume; and relevant mathematical problem.

Ideal gas cycles: Constant volume cycle; dual combustion cycle.

Refrigeration: Working cycle; the circuit of the refrigerant; capacity and performance and relevant numerical problem.

Steam: Enthalpy, wet steam; dry steam; superheated steam; mixing steam and water; throttling of steam; throttling of calorimeter; combined separating and throttling calorimeter and relevant mathematical problems.

Reciprocating air compressor: Effect of clearance; work-done per cycle; multi stage compression; free air delivery; isothermal efficiency

Boilers and combustion: Boiler efficiency; higher and lower calorific values; composition of flue gases; conversion from volumetric to mass analysis and relevant mathematical problems.



Turbine: The impulse turbine; the reaction turbine; velocity diagram for impulse and reaction turbines; force on blades; actual steam cycles; and thermal efficiency.

Recommended Text(s):

Applied Heat for Engineers, Reed's Publications

Joel, R. Basic Engineering Thermodynamics in S.I. Units. 5th ed. Harlow, Longmann, 1996.

Heat and Thermodynamics, 2005, Birijlal and N. Subrahmanyam, Publisher: S. Chand and Company Ltd.

Machine Drawing- I

Course Code : ME 2115

Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a general understanding of the technical aspects of engineering drawing to meet the mandatory minimum requirements for knowledge, understanding and proficiency related to maintenance and repair at the operational Level.

Learning Outcomes:

On completion of this course, students will be:

Competent to obtain any required information from engineering drawings produced to international standards and conventions.

Should the need arise; they will also be able to produce drawings of an adequate standard for the manufacture of components.

They will possess knowledge of design principles which will enable maximum benefit to be gained from subsequent experience.

Syllabus Contents:

Types of Drawing: General arrangement; assembly drawings; component drawings; single-part drawings; pictorial drawings.

Line-work: First angle and third angle projection; third-angle projection with hidden detail; auxiliary projection

Pictorial Projection: isometric projections; oblique projections

Development: The development of a 90° intersection of circular trucking, a cone, square pyramid, square-to-round transition piece.

Dimensioning: Dimensions a simple component, applying all correct standards

Geometrical Tolerancing: Tolerancing data to engineering drawings, to include examples of Straightness, flatness, roundness, cylindricity, concentricity, squareness, parallelism, angularity, position

Limits and Fits: various ways of indicating limits of size, including tolerance, actual size, basic size, nominal size, hole basis fits,

The interpretation of piping, hydraulic and pneumatic diagrams

Recommended text(s):

Engineering Drawings, 2006, Reeds series, H.G Beck

Simmonds, C.H. and Maguire, D.E. Progressive Engineering Drawing for T.E.C.

Students, London. Hodder and Stoughton Ltd 1983 (ISBN 03-40-26196-x-0)

F. Pickup and M.A Parker, Engineering Drawing with Worked Examples, 3rd Edition.

Electrical Machines

Course Code : ME 2117



Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a foundation on 'Electrical Machines' in regards to working principle, construction, characteristics and maintenance of different types of transformers and motors.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Construction and operational principles of DC generators and DC motors;
- Construction and operational principles of AC generators and AC motors;
- Construction, operation and performance of transformers; and
- Parallel operation of alternators.

Syllabus Contents:

DC generators: Working Principle of generators, Different types of DC generators, General Voltage Equation, no-load voltage characteristics and Application of DC generators. Build-up of a self-excited shunt generator, critical field resistance, load-voltage Characteristic.

DC generator characteristics: Effect of speed on no-load and load characteristics and voltage regulation. Shunt generator and compound generator. Parallel operation, winding connection of DC generator

DC motors: Operating differences between motors and generators, Torque, counter emf, speed and torque-speed characteristics, starting and speed regulation, Uses of DC motors.

AC generator: Elementary alternator, Construction, frequency, field, generated e.m.f, alternator characteristics, armature reaction, alternator regulation, windings of alternator.

Transformer: Working principle, Construction, Types- (core type & shell type), Elementary theory for ideal transformer, E.M.F. equation, Transformation ratio, Three phase transformer- (Operating principle, Different types of connection).

Vector diagram and Equivalent circuit: Transformer with losses but no magnetic leakage, Transformer with winding resistance but no magnetic leakage, Transformer with resistance and leakage reactance, Equivalent circuit of a transformer.

Transformer test & Performance: Voltage regulation, Transformer tests- (open-circuit & short-circuit test), Losses in a transformer, Efficiency & condition for maximum efficiency, Instrument transformer- (current & voltage Transformer).

Induction motor: Theory of operation, Advantage, Disadvantage, Construction, Production of rotating field- (two-phase & three-phase supply) & mathematical proof, Rotation principle, Slip, Frequency of rotor current.



Parallel operation of alternators: requirements, synchronising, synchronising lamp, synchronoscope, Field variation, dividing load in parallel operation, hunting.

Recommended Books:

B.L. Thereja & A.K. Thereja : A text book of Electrical technology (Vol-II)
Rosenblat & Friedman : Direct & Alternating current Devices
Stephen J. Chapman : Electric Machinery Fundamentals
Hall, D.T., Practical Marine Electrical Knowledge. London, Witherby & Co Ltd, 1984
Kraal, E.G.R., Basic Electro-technology for Engineers. 3rd ed. London, Thomas Reed Publications Ltd, 1985.

Computer Programming Sessional



Course Code : ME 2104
Credits : 1.0
Contact Hours : 28
Assessment : Attendance, workshop report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide the students with an overview and training in C++ such that they can efficiently do programming related to scientific simulation in their master-degree projects.

Learning Outcomes:

- To familiarize the trainee with the universal concepts of computer programming.
- To present the syntax and semantics of the “C”, “C++” language as well as basic data types offered by the language
- To discuss the principles of the object-oriented model and its implementation in the C”, “C++” language
- To demonstrate the means useful in resolving typical implementation problems with the help of standard C”, “C++” language libraries

Syllabus Contents:

In the sessional class all the topic described in the theory classes will be conducted practically.

Recommended Text(s):

- Teach Yourself C; Herbert Schildt
- Teach Yourself C++; Herbert Schildt
- The C programming language; B. Kernighan and D. Ritchie :

Electrical Machines Sessional



Course Code : ME 2118
Credit Hours : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

The students will perform experiments to verify practically the theories and concepts used in Electrical Machines.

Learning Outcomes:

The student will gain practical experience on:

- Construction and operational principles of DC generators and DC motors;
- Construction and operational principles of AC generators and AC motors;
- Construction, operation and performance of transformers; and
- Parallel operation of alternators.

List of Experiment:

- Testing of Single Phase Transformer equivalent Circuit : open & short circuit tests.
- Testing of single phase transformer with no load.
- Testing of single phase transformer with load.
- Measurement of three phase transformer open circuit voltage and phase shift between primary and secondary line voltages.
- Connections of three phase transformer: Y- Y, Y- Y, Y- Δ , Δ - Δ
- Characteristics of single phase induction motor: (i). No load and (ii) Load operating.
- Characteristics of separately excited dc motors in regards to torque/speed.
- Characteristics of shunt excited dc motors in regard to torque/speed.
- Study of DC generator.
- Operating characteristics of DC series motors.
- Parallel operation of synchronous machines.
- Measurement of rotor angle of a synchronous motor

Recommended Text(s):

- B.L. Thereja & A.K. Thereja : A text book of Electrical technology (Vol-II)
- Rosenblat & Friedman : Direct & Alternating current Devices
- Stephen J. Chapman : Electric Machinery Fundamentals
- Hall, D.T., Practical Marine Electrical Knowledge. London, Witherby & Co Ltd, 1984
- Kraal, E.G.R., Basic Electro-technology for Engineers. 3rd ed. London, Thomas Reed Publications Ltd, 1985

Machine Tools Sessional



Course Code : ME 2120
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a foundation for the development of skills in fabrication works using lathe, shaper, drill machine.

Learning Outcomes:

On completion of this course, the trainees will acquire skills on

- The use of lathes and shapping machines;
- The maintenance of machine tools to ensure that they are kept in good working order and ready for use;
- The correct procedure for setting up and securing work for given machining operations;
- Selecting the appropriate machine tools and machining sequence for any given task.

Syllabus Contents:

Square block: To make a square block by Shapper machine. The job involve measuring of MS shaft as per given measurement and scribing; cutting of the shaft by power hacksaw machine; fixing the shaft on shapper machine vice and carry out the job on shapper machine.

Tapered shaft: To make a tapered shaft on lathe machine. The work involve measuring of MS shaft as per given measurement and scribing; cutting of the shaft by power hacksaw machine; to fit the shaft on lathe machine chuck; to start the job on lathe machine.

Bolt & Nut: To make bolts and nuts on lathe machine. The work involve measuring of MS shaft as per given measurement and scribing; cutting of the shaft by power hacksaw machine; to fit the shaft on lathe machine chuck; continue to work on lathe machine.

Flange: To fabricate a flange using lathe machine and welding equipment. The job involve measuring of MS plate as per given measurement and scribing; cutting of the plate and GI pipe by hacksaw; to fix the plate on lathe machine chuck; welding of the GI pipe to the plate; polishing by emery cloth.

Gear: Making of gear teeth by lathe machine. The work involve measuring of MS shaft as per given measurement and scribing; cutting of the shaft by power hacksaw machine; to fit the shaft on lathe machine chuck; continue work on the lathe machine.



Screw Jack: To make screw jack on lathe machine. The job involve measuring of MS shaft as per given measurement and scribing; cutting of the shaft by power hacksaw machine; to fit the shaft on lathe machine chuck; continue work on the lathe machine.

Recommended Text(s):

Bruce J. Black(1982), Workshop processes, practices and materials
Pritchard, R.T. Technician Workshop Processes and Materials. London, Hodder and Stoughton, 1979.

Welding Technology



Course Code : ME 2122
Credit : 1.0
Contact Hours : 28
Assessment : Attendance, workshop report, note book, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide the theoretical and practical knowledge on different types of welding technology including metal arc welding, Gas Tungsten Arc Welding, gas cutting.

Learning Outcomes:

After successful completion of this course the students will have theoretical and practical knowledge on:

- Shielded Metal Arc Welding (SMAW) on tee, lap, corner, and butt joints to trade specifications in the flat, horizontal, vertical, and overhead positions.
- Gas Tungsten Arc Welding (GTAW) on tee, lap, corner, and butt joints in flat and horizontal positions with applicable filler rod on mild steel, stainless steel, and aluminum.
- Gas Metal Arc Welding on tee, lap, corner, and butt joints in flat, horizontal, and vertical positions using various filler wires on mild steel, stainless steel, and aluminum.
- Different type of welding defect.
- Theoretical and practical Knowledge about Cutting Process

Syllabus Contents:

- Different types of welding and their equipment & Welding principle
- Types of power sources and their characteristics
- Welding methods: MMAW, GMAW, SAW, Electro-slag welding, TIG
- Types of welding joints. Welding symbols
- Welding sequence in shipbuilding
- Common defects in ship welding
- Welding distortion monitoring and control
- Inspection and testing of welded specimen.
- Non-destructive testing. Methods and principles of cutting

Recommended Text(s):

- Welding and Welding Technology; RICHARD L. LITTLE
- Unitor Welding Handbook.
- Gas Welding and Cutting ; D. GLIZMANENKO AND G. YEVSEYEV
- Flood, C.R. Fabrication, Welding and Metal Joining Processes. London, Butterworth, 1981



Section: 6

Course Description: 2nd Year 2nd Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

Advanced Maritime Safety & Security



Course Code : ME 2201
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide the advanced training in Proficiency in survival craft and rescue boat, Fire Fighting, Medical First Aid, and Ship Security Officer in accordance with STCW'78 as amended and as per the guidelines provided in the relevant IMO model courses.

Learning Outcomes:

The course participants will be able to perform their duties on board on the following aspects in an efficient and effective manner. In addition, it will also fulfil the mandatory minimum requirements in the following subjects to obtain the Certificate of Competency for officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room.

- Proficiency in survival craft and rescue boat
- Advanced Fire Fighting
- Medical First Aid
- Ship Security Officer

Syllabus Contents:

Proficiency in survival craft and rescue boat

- Introduction and safety
- Abandon ship
- Launching arrangements
- Evacuation and recovery of survival craft and rescue boats
- Actions to take when clear of the ship
- Lifeboat engine and accessories
- Rescue boat outboard engine
- Handling survival craft and rescue boats in rough weather
- Actions to take when aboard a survival craft
- Methods of helicopter rescue
- Hypothermia
- Radio equipment
- First aid
- Drills in launching and recovering boats
- Drills in launching liferafts
- Drills in launching and recovering rescue boats

Advanced Fire Fighting

- Control fire-fighting operations aboard ship
- Organize and train fire parties



Inspect and service fire detection and extinguishing systems and equipment
Investigate and compile reports on incidents involving fire

Medical First Aid

- 1.Immediate action
2. First-aid kit
- 3.Body structure and functions
- 4.Toxicological hazards aboard ship
- 5.Examination of patient
- 6.Spinal injuries
- 7.Burns, scalds and effects of heat and cold
- 8.Fractures, dislocation and muscular injuries
- 9.Medical care of rescued persons, including distress, hypothermia and cold exposure
- 10.Radio medical advice
- 11.Pharmacology
- 12.Sterilization
- 13.Cardiac arrest, drowning and asphyxia
- 14.Psychological/Psychiatric Problems

Ship Security Officer

Introduction
Marine Security Policy
Security Responsibilities
Ship Security Assessment
Security Equipment
Ship Security Plan
Threat Identification, Recognition, and Response
Ship Security Actions
Emergency Preparedness, Drills, and exercises
Security Administration
Security Training

Recommended Text(s):

Seamanship Technique- DJ House
Illustrated Seamanship- Dedekam
Nocholl's Seamanship & Nautical Knowledge- A.N.Cockroft
Seamanship notes – Angus Ferguson
American Merchant Seaman's manual – William B.Hayler
Basic Seamanship – Clossold revised by Miller
Theory and Practice of seamanship – Graham Danton
Knight's modern seamanship- John Noel
IMO Model Course : 1.20, 1.13, 1.19, 3.26, 3.27, 1.21
Seamanship notes – Kemp & Young



Lifeboat and Life Raft – S.K. Puri
Survival at Sea – C.H.Wright

Basic oil and Chemical Tanker Cargo Operation

Course Code : ME 2203



Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide basic training on oil and chemical tanker cargo operation to meet the mandatory requirements for training ship's crews – Reg. V/1-1 para 2.2 and Code A- V/1-1 para 1, table V/1-1-1 of the STCW 78 as amended in 2010.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- The basic safety and pollution prevention precautions and procedures,
- Layouts of different types of oil and chemical tankers, types of cargoes, their hazards and their handling equipment.
- The duties and responsibilities related to cargo and cargo equipment.

Syllabus Contents:

Introduction & Basic knowledge of tankers: Types of oil tankers, Types of Chemical, Basic knowledge of ship arrangements of an oil tanker tankers, Basic knowledge of ship arrangements of a chemical tanker

Physical and chemical properties of oil and chemicals: Basic physics, Basic chemistry, chemical elements and groups, Physical properties of oil and chemicals carried in bulk

Knowledge and understanding of tanker safety culture and safety management:

Hazards: Health hazards, Environmental hazards, Reactivity hazards, Corrosion, Explosion and Flammability hazards, Sources of ignition, Including electrostatic Hazards, Toxicity hazards, Vapour leaks and clouds, Basic knowledge of hazard controls: Inerting, water padding, drying agents and monitoring techniques, Anti-static measures, Ventilation, Cargo segregation, Cargo inhibition, Importance of cargo Compatibility, Atmospheric control, Gas Testing, Understanding of Information on a Material Safety Data Sheet (MSDS).

Safety: Function and proper use of gas-measuring Instruments, Proper use of safety equipment and protective devices including: breathing apparatus and tank-evacuating Equipment, protective clothing and equipment, resuscitators, rescue and escape equipment.



- 5. Fire Safety and Fire fighting operations:** Oil and Chemical Tanker fire response organization and action to be taken, Fire hazards associated with cargo handling and transportation of hazardous and noxious liquids in bulk, Fire-fighting agents used to extinguish oil and chemical fire, Fixed fire-fighting foam operations, Portable fire-fighting foam operations, Fixed dry chemical system operations, Spill containment in relation to fire-fighting operations
- 6. Cargo operations:** For oil tankers: Cargo information, Loading, Unloading, Pump characteristics, Tank cleaning, Purging and gas freeing; For Chemical Tankers: Cargo information Loading, Unloading, Tank cleaning and gas-freeing.

Emergencies: Basic knowledge of emergency procedures, including emergency shutdown, Organizational structure, Alarms, Emergency procedures, First-aid treatment.

Pollution Prevention: Basic knowledge of the effects of oil and chemical pollution on human and marine life, Basic knowledge of shipboard procedures to prevent pollution, SOPEP.

Recommended Text(s):

ICS/OCIMF/IAPH, International safety Guide for Oil Tankers and Terminals, 4th edition, London: Witherby and Co. Ltd.

International Chamber of Shipping, Tanker Safety Guide (Chemicals), 2nd edition, London: Witherby and Co. Ltd.

H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann
Chemical Tanker Notes – Vladimir Kunichkin

Turbocharger and Scavenging Technology

Course Code : ME 2205
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination, Class tests
Faculty in Charge :

Aims:

To provide an understanding on the operation, maintenance and trouble-shooting on turbocharger, scavenging and associated systems of main and auxiliary engines.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Main and auxiliary engine turbocharger construction, operation, maintenance and trouble shooting.

Two and four stroke engine scavenging system

Construction, operation and maintenance of main and auxiliary engine air cooler, scavenge and exhaust manifold.

Syllabus Contents:

Turbocharger: Construction, operation, maintenance, water and washing, lubrication, surging, breakdown, temporary and permanent repair

Scavenging System: Scavenging arrangements in 2-stroke engines; Air charging and exhausting in 4-stroke engines; Various types of Scavenging in 2-stroke engines; Uni-flow, loop, cross loop and reverse loop scavenging, their merits and demerits, Scavenge pumps for normally aspirated engines; under piston scavenging, Scavenge manifolds, scavenge valves, non return valves, auxiliary blowers.

Supercharging arrangements: Pulse and constant pressure type; Their relative merits and demerits in highly rated marine propulsion engines. Air movements inside the cylinders.

Air cooler: Construction; Cooling arrangement and maintenance.

Exhaust and scavenge manifold: Inspection and maintenance.

Recommended Text(s):

Morton, TD Motor Engineering Knowledge for Marine Engineers. London.

Thomas Reed Publications Ltd, 1994 (ISBN 09-01-2856-5)

A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemann.

Engineering Watch-Keeping

Course Code : ME 2207
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

This course aims to provide the basic principles to be observed in watch-keeping duties of an officer in charge of an engineering watch in a manned engine-room or designated duty engineer in a periodically unmanned engine-room, both at sea and in port as per STCW regulation VIII/2 and STCW Code chapter VIII.

Learning Outcomes:

After successful completion of this course students will have sufficient knowledge on:

- Duties associated with taking over a watch and handing over watch;
- Routine duties undertaken during a watch;
- Machinery space logs and the significance of the reading taken;
- Standards/regulations for watch-keeping in the national law;
- The importance of watch-keeping, and the need to wear appropriate clothes, maintain bodily functions; be awake and highly consciousness and so on.

Syllabus Contents:

STCW'78 as amended: Standards of Training, certification & Watch-keeping for seafarers-International Conference of 1978 as amended.

Bangladesh Merchant Shipping Act: Port Procedures. Pilotage, Duties regarding pollution. Collision, Explosion fire etc. Vessels in distress. Shipping casualties, penalties under Merchant Shipping Act.

Basic Principles to be observed in keeping engineering watch: Criteria for composing the engine room watch. Operation & watch requirements. Fitness for duty. Protection for marine environment. Requirement for certification; minimum knowledge requirement for certification-theoretical, practical; duties & responsibilities concerning safety & protection of environment. Requirements for watch keeping duties. Physical training & experience in watch-keeping routine; Main and aux machines, pumping systems, Generating plant, Safety and emergency procedures. First aid.

Minimum requirement for Engine Room watch: Special requirement for engineer officer for Oil Tankers, Chemical Tankers and Gas Tankers. Details of operational guidance for In-charge of an engineering watch.

Engineering watch (underway): General, Taking over watch, Periodic checks of machinery, Engine Room Log, Preventive repair and maintenance; Bridge notification. Navigation in congested water and during restricted visibility, calling the attention of the Chief Engineer Officer.



Engineering Watch (Unsheltered anchorage): Conditions to be ensured.

Watch-keeping (in Port): Watch arrangements; Taking over the watch; Keeping a watch, Safety precautions to be observed during a watch and immediate actions to be taken.

Engine room resource management

Recommended Text(s):

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Applied Mechanics

Course Code : ME 2209

Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes of basic engineering science in line with Table A-III/1 of Section A-III/1 of the STCW'78 Convention as amended in 2010, for a candidate for certification as officer in charge of an engineering watch.

Learning Outcomes:

Upon completion of this course, the trainees will gain:

- Background knowledge to support an understanding of the physical principles underlying the behavior of the ship and its environment.
- Functioning of equipment upon which to build professional studies.
- Understanding in technical specifications and instructions regarding equipment normally used on board ship

Syllabus Contents:

- Vector & Vector diagrams
- Velocity and Acceleration
- Mass- Accelerating Force
- Work, power and Energy
- Centripetal Acceleration
- Sliding Friction
- Moments
- Lifting Machines
- Stress & Strain
- Strength of Pressure vessels
- Bending of Beams
- Stresses in Beams
- Torsion
- Hydraulics

Recommended Text (s):

- William Embleton & J.T Gunn, Reeds applied Mechanics for Engineers, 4th Edition.
- Hannah—Hillier, J. Applied Mechanics. Harlow, Longman 1995.

Control Engineering-I

Course Code : ME 2211
Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide the basic knowledge and understanding on pneumatic P, PI and PID control system including the measurements and mechanism of sensing process values and relevant instrumentation.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Various temperature, pressure and level measuring instruments;
- Operational principles of various control systems including positioner;
- Various process control systems including M/E L.O, C.W, Boiler water level control system;
- Maintenance of control system.

Syllabus Contents:

- Fundamentals of Automatic Control
- Various Automatic Controls
- ON-OFF Control
- Sequential Control
- Proportional-Integral-Derivative (PID) Control
- Measurement of Process Value: Temperature; Pressure; Level; flow;
- General Measurement of Processes
- Transmission of Signals: Transmitters; Controlling Elements- pneumatic, electrical
- Manipulator Elements: Pneumatic; Electrical Servomotors; Hydraulic Servomotor
- Flowchart for Automatic and Control Systems

Recommended Text(s):

- Jackson L. and Morton T.D (1999), Reed's General Engineering Knowledge for Marine Engineers.
- Taylor, D.A. Introduction to Marine Engineering. 2nd ed. London, Butterworth. 1990
- Morton, TD Motor Engineering Knowledge for Marine Engineers, 1999, London: Thomas Reed Publications Ltd, 1994 (ISBN 09-01-2856-5)
- A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemann.

Refrigeration and Air-Conditioning Technology

Course Code : ME 2213
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a foundation for the appreciation of the working principle, operation and maintenance of marine refrigeration and air conditioning technology in line with the requirement of the operation level certificate of competency.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Working principles of refrigeration, air conditioning and ventilation systems;
- Characteristics and regulatory requirements of gases, oils in the above system;
- System components, maintaining the temperature and humidity, trouble shooting.

Syllabus Contents:

Refrigeration: Principles of refrigeration; Marine refrigeration cycle; Refrigerating compressors; Refrigerating system components; Refrigerating system brines; Cold storage spaces, Refrigerants used in marine practice and their justification, Control of temperature in various rooms in domestic Plants.

Air conditioning and ventilation systems: Block diagram of an air conditioning system, system components and arrows to indicate flow of refrigeration showing the components such as fan, thermostat, fresh air damper, return air dumper, States how to control temperature and humidity in the air conditioning system, Operation and maintenance of Plants. Control and Safety equipment.

Machinery and Cargo Ventilation: Design and constructional details, International Requirements, Operation & maintenance of Equipment.

Recommended Text(s):

- Jackson, L and Morton, T.D. General Engineering Knowledge for Marine Engineers. 5th ed. London, Thomas Reed Publications Ltd 1990. (ISBN 09-47-63776-1)
- H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann
- D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Machine Drawing-II

Course Code : ME 2215
Credits : 2.0
Contact Hours : 28



Assessment : Term end written examination, Class test
Faculty in Charge :

Aims:

To provide an advanced understanding of the technical aspects of engineering drawing including the assembly drawings of main and auxiliary machinery components.

Learning Outcomes:

On completion of this course, trainees will be able to carry out:

Assembly drawings of main machinery, sectional, outside and plan views of parts fitted, removed & in functional order.

Marine auxiliary equipment dismantled; to conceptualize in assembly and lay out as working & functional parts.

Syllabus Contents:

Marine machinery components and auxiliary equipment dismantled; to be conceptualized in assembly and laid out as working & functional parts. Sectional views in elevation & plans executed. Part sectional views depiction. Such auxiliary equipment to include:

Reducing valve
Bilge suction strainer
Crane hook
Four ram steering gear
Oil fuel strainer
Gear pump

Marine engine components dismantled. Assembly drawings of main machinery. Sectional, Outside and plan views of parts fitted, removed & in functional order. Such drawings should include:

Fuel Control lever
Air inlet valve
Cylinder relief Valve
Starting air pilot valve

Recommended text(s):

Engineering Drawings, 2006, Reeds series, H.G Beck
Simmonds, C.H. and Maguire, D.E. Progressive Engineering Drawing for
T.E.C. Students, London. Hodder and Stoughton Ltd 1983
F. Pickup and M.A Parker, Engineering Drawing with Worked Examples, 3rd Edition

Power System Protection

Course Code : ME 2217
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a foundation for the appreciation of electrical power system protection device used on board the ship in line with operational level certificate of competency.

Learning Outcomes:

The student will gain sufficient understanding on 'Power System Protection' in regards to switchgear, fuse & relay, circuit breakers and breaker ratings; transformer, generator, motor, bus and transmission line protection; static, digital and numerical relay.

Syllabus Contents:

Introduction to Switchgear: Purpose of power system protection, Introduction to Switchgear, circuit interruption and protection. Criteria for detecting faults and requirements of protective devices, Terminologies and general characteristics of relays and circuit breaker

Fuse & Relay: Fuse and it's types, Relays: over-current, differential, directional, distance. Electromechanical relay.

Circuit breakers: control systems, Trip circuit, arc extinction methods, Types of circuit breaker, Different types of protective devices used in Switchgear.

Circuit breaker ratings: circuit breaker ratings, recovery voltage, TRV, Switching in a capacitive circuit, Current chapping. Air, Oil, air blast, SF6, vacuum and high voltage DC circuit breaker, Selection criteria, testing of circuit breakers.

Transformer protection: Different types of faults in Transformer, different types of protection scheme in transformer, Buchholz Relay etc. Integrated HV transmission line protection, Combined Transformer and Bus bar protection.

Generator and Motor protection: Introduction, Different types of faults in Generator and motor, different types of protection scheme.

Bus and Transmission line protection: Bus bar arrangement, Pilot-wire and carrier current protection, different types of Bus and Transmission line protection scheme, Over voltage protection, lightning and lightning arresters, Grounding.

Static and digital/numerical relay: definition, features, Operation, application, Block diagram and types, Microcontroller and Microprocessor based protection.

Recommended Text(s):

Kraal, E.G.R., Basic Electro-technology for Engineers. 3rd ed. London, Thomas Reed Publications Ltd, 1985 (ISBN 0-900335-96-3)
Hall, D.T., Practical Marine Electrical Knowledge. London, Witherby & Co Ltd, 1984
V.K. Mehta, Principles of Power System



J. Lewis Blackburn, Protective Relaying
Sunil S. Rao, Switchgear and protection
B. Ravindranath ,Power system protection and Switchgear
T. Davis, Protection of Industrial power systems

Advanced Maritime Safety and Security Sessional

Course Code : ME 2202
Credits : 2.0
Contact Hours : 56



Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide practical training in Proficiency in survival craft and rescue boat, Fire Fighting, Medical First Aid, and Ship Security Officer in accordance with STCW'78 as amended and as per the guidelines provided in the relevant IMO model courses.

Learning Outcomes:

The course participants will be able to perform their duties on board on the following aspects in an efficient and effective manner. In addition, it will also fulfil the mandatory minimum requirements in the following subjects to obtain the Certificate of Competency for officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room.

- Proficiency in survival craft and rescue boat
- Advanced Fire Fighting
- Medical First Aid
- Ship Security Officer

Syllabus Contents:

Proficiency in survival craft and rescue boat

Drills and exercises relevant to

- Abandon ship
- Launching arrangements
- Evacuation and recovery of survival craft and rescue boats
- Actions to take when clear of the ship
- Lifeboat engine and accessories
- Rescue boat outboard engine
- Handling survival craft and rescue boats in rough weather
- Actions to take when aboard a survival craft
- Methods of helicopter rescue
- Hypothermia
- Radio equipment
- First aid
- Drills in launching and recovering boats
- Drills in launching liferafts
- Drills in launching and recovering rescue boats

Advanced Fire Fighting

Drills and exercises relevant to:

- Control fire-fighting operations aboard ship
- Organize and train fire parties
- Inspect and service fire detection and extinguishing systems and equipment
- Investigate and compile reports on incidents involving fire



Medical First Aid

Demonstration and first aid relevant to:

- 1.Body structure and functions
- 2.Toxicological hazards aboard ship
- 3.Spinal injuries
- 4.Burns, scalds and effects of heat and cold exposure
- 5.Fractures, dislocation and muscular injuries
- 6.Sterilization
- 7.Cardiac arrest, drowning and asphyxia
- 8.Psychological/Psychiatric Problems

Ship Security Officer

Drills and exercises relevant to:

- Security Responsibilities
- Ship Security Assessment
- Security Equipment
- Ship Security Plan
- Threat Identification, Recognition, and Response
- Ship Security Actions
- Emergency Preparedness, Drills, and exercises
- Security Administration
- Security Training

Recommended Text(s):

- Seamanship Technique- DJ House
- Illustrated Seamanship- Dedekam
- Nocholl's Seamanship & Nautical Knowledge- A.N.Cockcroft
- Seamanship notes – Angus Ferguson
- American Merchant Seaman's manual – William B.Hayler
- Basic Seamanship – Clossold revised by Miller
- Theory and Practice of seamanship – Graham Danton
- Knight's modern seamanship- John Noel
- IMO Model Course : 1.20, 1.13, 1.19, 3.26, 3.27, 1.21
- Seamanship notes – Kemp & Young
- Lifeboat and Life Raft – S.K. Puri
- Survival at Sea – C.H.Wright

Applied Mechanics Sessional

Course Code : ME 2210
Credits : 1.0
Contact Hours : 28



Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a practical understanding on the basic concepts, principles and processes of basic engineering science.

Learning Outcomes:

Upon completion of this course, the trainees will gain hands on experience on:

Verifying the working principle of various lifting devices including finding out the velocity ratio, mechanical advantage and efficiency.

Calibration of pressure gauge and thermometer including finding out various kinds of error.

Measurement of viscosity and finding out the stability of floating body.

List of Experiments:

Measurement of Viscosity
Stability of a floating body
Calibration of Pressure gauge
Calibration of Temperature
Worm and wheel apparatus
Bearing friction (Flywheel apparatus)
Wheel and differential axle apparatus
Extension of wire (Searle's Apparatus)
Efficiency of Screw thread apparatus
Efficiency of Spur gear lifting machine

Recommended Text (s):

William Embleton & J.T Gunn, Reeds applied Mechanics for Engineers, 4th Edition.
Hannah—Hillier, J. Applied Mechanics. Harlow, Longman 1995.

Power System Protection Sessional

Course Code : ME 2218
Credits : 1.0
Contact Hours : 28



Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To perform experiments to verify practically the theories and concepts learned in Power System Protection.

Learning Outcomes:

The student will gain sufficient hands on experience on 'Power System Protection' in regards to switchgear, fuse & relay, circuit breakers and breaker ratings; transformer, generator, motor, bus and transmission line protection; static, digital and numerical relay.

List of Experiments:

- Study of protection system using Fuse.
- Study of protection system using M.C.B Circuit breaker.
- Study of different types of circuit breaker.
- Study of different types of Relay.
- Differential protection of a transformer and generator.
- Differential protection of a bus bar.
- Design of a protective switchboard system.
- Visit to a generating station and protection system of a Ship.
- Visit to a power plant or Sub-station.

Recommended Text(s):

- Kraal, E.G.R., Basic Electro-technology for Engineers. 3rd ed. London, Thomas Reed Publications Ltd, 1985
- Hall, D.T., Practical Marine Electrical Knowledge. London, Witherby & Co Ltd, 1984
- V.K. Mehta, Principles of Power System
- J. Lewis Blackburn, Protective Relaying
- Sunil S. Rao, Switchgear and protection
- B. Ravindranath, Power system protection and Switchgear
- T. Davis, Protection of Industrial power systems

Maintenance of Main and Auxiliary Machinery

Course Code : ME 2220
Credits : 1.0
Contact Hours : 28
Assessment : Attendance, Laboratory report, note book, Quiz, Viva voce



Faculty in Charge :

Aims:

To provide the principles of the practical maintenance of main propulsion machineries as installed in the training establishment. The will then be further prepared for training in similar work in real life situations on board ship.

Learning Outcomes:

The students will have sufficient skill on the maintenance and repair such as dismantling, adjustments and reassembling of main machinery components such as cylinder liner, piston, bearings, fuel injection pump, valves, turbocharger etc.

Syllabus contents:

Diesel Engine: Dismantles and inspects all parts for wear and deterioration, and assembles including: pistons; rings; liners; bearings; valves; cooling passages; crankshaft alignment; lubrication system; cylinder heads; exhaust valves; air-start valves; fuel injector; relief valve; fuel injection pump; Checks timing and ascertains freedom of movement; Checks condition of lubrication oil; Purges air from fuel system.

Turbocharger (Supervised Student Activity): Dismantles: air filter; air casing; inducer (if fitted); impeller; volute; diffuser; gas inlet grid; nozzle ring; rotor; bearings. Examines all parts for wear and deterioration, paying particular attention to: erosion in the air side; erosion in the turbine nozzles and in the blades; corrosion of the gas casing; hard deposits; damage to balding; condition of bearings; condition of labyrinths; obstructions in the bleed and sealing passages; lubrication system; Reassembles and checks clearances.

Boiler (Supervised Student Activity): Explains the need for cleaning the fire side of a boiler and how to do it; Describes how to inspect the fire side of a boiler and repair/maintenance; Explains the need of cleaning up the water side of a boiler and how to do it; Describes how to inspect the water side of a boiler and the repair/maintenance; Describes how to restore the boiler after prolong shut down.

Air Compressors (Supervised Student Activity): Dismantles, examines and replaces or repairs as found necessary: suction and delivery valves and seats; piston and rings; glands/seals; relief valves and bursting discs coolers and cooling passages; lubricating oil system; drains
Thrust block, Stern tube, Shaft bearings, Shaft sealing equipment.

Centrifugal Pumps (Supervised student activity): Dismantles casing; impeller; wear rings; shaft; bearings; gland/seal; air pump; float chamber; Examines and measures all parts for wear and deterioration; Re-fits, checking, clearances; Replaces and adjusts



seals.

Reciprocating Pumps (Supervised student activity): Dismantles cylinders; piston/buckets; rings; valves; joints; glands; relief valves; Measures wear in cylinders, neck rings and rods; checks ring gaps; Machines and/or grinds in valves and seats; Removes gland packing; Selects and fits new gland packing.

Screw and Gear Pumps (Supervised Student Activity): Dismantles rotors and gears; seals; bearings; relief valve; Examines for wear and deterioration; Re-fits, checking end clearances and backlash; Replaces and adjusts seals.

Valves (Supervised Student Activity): Examines seats, valves, spindles, glands; Machine valves and seats; Beds in valves on seats, using grinding paste; Removes old gland packing; Selects correct gland packing; Repacks glands.

Heat Exchangers (Supervised Student Activity): Dismantles and examines for leakage; for corrosion; for erosion; for fouling; Checks provision for tube expansion;; de-scales; replaces tubes; plugs tubes; secures tube tightness in tube plates; checks means of reducing corrosion.

Refrigeration Maintenance (Supervised Student Activity): Compressors; Evaporator; Condenser; Expansion valve; Oil separator.

Oils Fuels and Lubricating System Maintenance (Supervised Student Activity): Filters; Purifiers; Bearings; Settling-tanks; Tank contents gauges.

Deck Machinery Maintenance (Supervised Student Activity): Lifeboat davits and gear; Mooring winch; Windlass; Winch; Crane



Section: 7

Course Description: 3rd Year 1st & 2nd Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

On-Board Training

Course Code : ME 3002



Credits : 6.0
Assessment : Training record book, Demonstration, Viva voce
Faculty in Charge :

An approved seagoing service of not less than 12 months as part of an approved training programme which includes onboard training that meets the requirements of section A-III/1 of the STCW Code and is documented in an approved training record book.

Alternative

Course Code : ME 3004
Credits : 6.0
Assessment : Training record book, Demonstration, Viva voce
Faculty in Charge :

Students may perform 12 months apprenticeship in a ship management company, port authority, Ship-yard, dry-dock, power plant, marine workshop, Engine manufacturer and distribution company or any other similar organization approved by the appropriate authority.



Section: 8

Course Description: 4th Year 1st Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

Research Methodology

Course Code : ME 4101
Credits : 2.0



Contact Hours : 28
Assessment :
Faculty in Charge :

Aims:

This course aims to improve academic writing and to provide an introduction to research methods

Learning Outcomes:

On completion of the course, the student must be able to collect, analyse and present his/her own data using grounded theory or qualitative content analysis

Syllabus Contents:

Introduction to The Process of Conducting Research, Research Design Introduction, Steps in the Process of Research, Identifying a hypothesis and/or research problem, specifying a purpose, creating research questions, Reviewing literature, Ethics of research and informed consent

Introduction to Qualitative Research: Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Phenomenology, Grounded Theory, Ethnography, Case Study Interpreting Qualitative Data: Qualitative Data Analysis Procedures, Coding, Thematic development

Introduction to Quantitative Research: Essence of Quantitative Data, Collection and Analysis Techniques

Sampling Concepts: Defining the Target Population, Representative Sample, Potential Consequences of Unrepresentative Sampling (Gaming the System), Over Representative Subgroups / Weighting, Design Effect, Sampling Methods (Cluster, Stratified, Simple Random)

Quantitative Data Collection Instruments: Choosing a good instrument, Interval and Ratio Scales

Introduction to Applied Statistics: Identifying the dependent and independent variables, Confidence levels, Math that manipulates data

Descriptive Statistics: Summarizing and describing a collection of data, Univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, Identifying randomness and uncertainty in data

Inferential Statistics: Drawing inference from data, Modeling assumptions, Identifying Patterns, Regression analysis, T-test, Analysis of Variance, Correlations, Chi-square

Introduction to Mixed Methods Research: Advantages, Design Components, Explanatory Mixed Methods Framework, Exploratory Mixed Methods Framework

Data Mining –Finding the Patterns and Problems in the World of Data

Writing About Quantitative Findings

Writing About Qualitative or Mixed Methods Findings



Critically critiquing Research Reports
Applying Research in the Security Environment

Recommended Text(s):

Research Design: Qualitative, Quantitative, and Mixed Methods Approaches- John Creswell
Business Research Methods–Donald Cooper & Pamela Schindler, TMGH, 9th edition
Business Research Methods-Alan Bryman & Emma Bell, Oxford University Press
Research Methodology –C.R.Kothari

Thesis on Maritime Topics

Course Code : ME 4000
Credits : 4.0
Contact Hours : 56



Assessment :
Faculty in Charge :

Aims:

In-depth study on maritime topics to demonstrate skill in research, writing and analysis

Learning Outcomes:

The students will gain hands-on research experience through completing a research project, starting with hypothesis development (if applicable), literature searching, experimental design, data collection, analysis, and interpretation. Students will also gain experience in written and oral scientific communication by submitting several written components including a research proposal, a progress report, and final thesis for evaluation as well as presenting the results of their research in a public oral presentation

Syllabus Contents:

Students will engage in independent research, to produce an original thesis on maritime topics. This may take the form of a paper or report with supporting documentation, images and notes. Research may consist of archival investigation and/or fieldwork, including personal interviews, site reports, and condition assessments.

The process of writing and submitting a thesis will provide students with understanding and competence in research and writing about conservation and preservation issues, which will be of use in the professional field.

Students will be assigned a thesis advisor, with whom they will meet regularly.

The thesis should be 40-50 pages of text, with supporting documentation, images and notes.

Research may consist of archival investigation and/or fieldwork, including personal interviews, site reports, and condition assessments. Students must consistently use a citation format of their choice.

A small panel of 2 or 3 markers, which will include the student's advisor, will decide the thesis grade. Students will meet with this panel for a Final Discussion. This will be a 30-minute conversation about the thesis where students will be given feedback and a chance to discuss future plans. The discussion will not impact the student's grade.

There should be schedule and deadline including progress report and progress meeting to submit the thesis paper advising by the panel and research supervisor.

Manoeuvring and Associated Systems

Course Code : ME 4103
Credits : 3.0
Contact Hours : 42



Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide a basic understanding on the concepts, principles and processes in manoeuvring and associated systems.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

The construction, working principle and maintenance of air compressors, air reservoirs, and air starting system.

Fully conversant with the manoeuvring system

Operation of governors and automation in diesel engine plants.

Syllabus Contents:

Air starting system: Preparing the vessel for manoeuvring; Classification society requirements regarding air starting system

Air compressor: Two and three stage; effects of clearance; volumetric efficiency; filters; pressure relief valves; lubrication; defects; automatic drain, air vessels; cooling systems; distilled water; lubrication oil.

Air Reservoir: Classification society requirements, construction, Maintenance and safety.

Air supply system including control air.

Manoeuvring diagrams: Description of the system; location and purpose of various filters, valves and actuators; Starting and reversing systems of different Marine Diesel engines with safety provisions; starting air overlap; firing interval; starting air valves; air distributor; general reversing details; lost motion clutch.

Safety devices incorporated in manoeuvring system.

Diagnosis and rectification of fault in the manoeuvring system.

Governors: Functions of governor; various types of Governors; Centrifugal and inertia types of Governors, Sensitiveness; Stability and Hunting of Governors; Governor effort and power Consideration of friction in governors.

Automation in modern diesel engine plants: Remote operation, Alarm and fail safe system, Governors and their basic functions. Constant speed and Over speed governors. Constructional details and hunting of governor

Recommended Text(s):

Morton, TD Motor Engineering Knowledge for Marine Engineers. London.

Thomas Reed Publications Ltd, 1994 (ISBN 09-01-2856-5)

MAN B&W manufacturers operations manual

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.



4. A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemann.

Fuels and Lubricants

Course Code	: ME 4105
Credits	: 2.0
Contact Hours	: 28
Assessment	: Term end written examination and class tests



Faculty in Charge :

Aims:

To provide a foundation for the appreciation of the properties, use, maintenance of fuels, lubricants and Purifiers.

Learning Outcomes:

On completion of this course and mandatory sea service, trainees will possess sufficient basic knowledge of fuels and lubricating oils to understand and follow instructions which might be given to a watch keeping engineer officer regarding the testing and treatment of fuels and lubrication oils.

Syllabus Contents:

Fuels: Source of supply, Study of Primary Fuels, Coal, petroleum, natural gas, classification of fuels. Treatment of fuels for combustion in marine I.C.E. and steam plants, Composition of petroleum, The distillation process, Testing of liquid fuel: Density; viscosity; viscosity scales; temperature; flash point; calorific value; pour point; carbon residue; water in oil; fire point; acidity or alkalinity; octane number; cetane number, ISO specification of marine fuel, Combustion of fuel, Oil fuel additives, Clean air act; Viscosity control

Lubricants: Manufacture of lubrication oil, Theories of Lubrication, Types of Lubricants and their Properties suitability of Lubricants for various uses; solid and fluid lubricants. Additive Oils and their specific use, Terminology used in Lubrication systems. Loading pattern of various bearings in marine use and Lubrication system adopted. Different types of bearings used for marine machineries, Factors affecting hydro-dynamic lubrication, Shipboard lubricating oil test; Microbial degradation of lubricating oil, grease.

Oil Purification: Theory of oil Purification, Principles of operation and construction of different Centrifuges for fuel oil, Principles of operation and construction of different Centrifuges for lubricating oil.

Recommended Text(s):

Jackson L. and Morton T.D (1999), Reed's General Engineering Knowledge for Marine Engineers.

H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and



Heinemaan.

Fuel Combustion System and Energy Efficiency

Course Code : ME 4107
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and class tests



Faculty in Charge :

Aims:

To provide a foundation for the appreciation of the fuel combustion process including its energy efficiency. Construction, operation and maintenance of the equipment relevant to fuel combustion process will also be discussed.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- Fuel oil supply and circulating system to the engines.
- Construction, operation, maintenance of filters, fuel valves, fuel pumps, hydraulic actuator, viscotherm etc.
- Process in the fuel combustion system
- Energy efficient ship design and operation.

Syllabus Contents:

- Fuel oil supply and circulating system
- Fuel oil filters: Strainers and filters, types of marine filters, auto-cleaner and Duplex filters, Static filters, Priming and core maintenance of filters.
- Fuel Pump: Types of fuel pump, construction and description, maintenance, safety devices; Fuel pumps and metering devices: Jerk and Common rail systems; Helical groove and spill valve type fuel pumps.
- Fuel Valve: Drawing and operational principle, atomization, penetration and turbulence; maintenance and testing of injectors.
- Viscotherm and heater: Operational principles and maintenance; System for burning heavy oil in slow and medium speed marine engines.
- Fuel pump timing including variable injection timing
- Combustion of fuels in I.C. Engines; Grades of suitable fuels, Preparation of fuels for efficient Combustion, Design aspects of combustion chamber.
- Cams and hydraulic actuator: Types of cams and followers, Specified motion of followers. Uniform acceleration & deceleration, S.H.M. and uniform velocity Graphical construction of cam-profile.
- Energy-Efficient Ship Design and Operation:** Technological innovation related to energy management in the maritime industry; the basic process of onboard power generation and principal energy consumers; energy-saving measures in both ship design and operation; ship design and energy efficiency through ship resistance reduction means and propulsion efficiency improvement technologies; ship operation and energy efficiency through operational measures requiring the integration of port/ship duo.

Recommended Text(s):

1. Morton, TD Motor Engineering Knowledge for Marine Engineers. London. Thomas



Reed Publications Ltd, 1994

D.K Sanyal (1990) Marine Diesel Engine

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemaan.

A.J Wharton, 1991, Diesel Engines, 3rd edition Publisher: Butterworth and Heinemaan.

Deck Machinery and Cargo Equipment

Course Code : ME 4109

Credits : 2.0

Contact Hours : 28



Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, working principles and processes relevant to deck machinery, cargo equipment and basic seamanship.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Hydraulic system construction, operation and maintenance i.e. windlass, winch, cranes, remote control valve etc.

Operation, maintenance and maintenance of cargo handling equipment

Basic seamanship skill.

Syllabus Contents:

Deck Machinery:

Hydraulic System: Main Components, Accumulator, Centralised hydraulic power system, Axial piston variable stroke pump, Controller & power supply, Spool valve with shut off and direction control, RAM & Rotary Vane Actuators, Open & Closed loop systems, Hydraulic fluid

Windlass, winch, Gypsy, Capstan, Hydraulic Cranes

Remote control valve

Anchors, their use, dropping and weighing anchor, Cable stopper, Air whistle

Cargo Handling Equipment:

Operation and maintenance of Crane, hatch cover, Cargo stowage.

Mooring and unmooring

Basic Seamanship

Rope Knots: Types of knots. Practice of knot formation, Materials of ropes,

Strength, Care and maintenance, use of mooring line, heaving line, Rat guards.

Practical: Knots, bends and hitches, Ropes splice,

Recommended Text(s):

D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth

Capt P. Roberts, Watch-keeping Safety and Cargo Management in Port. London, The Nautical Institute, 1995

Maritime and Coastguard Agency (MCA), Code of Safe Working Practices for Merchant Seamen, London. The Stationery Office Publications Centre, Consolidated



Edition, 2009

Engineering Materials

Course Code : ME 4111
Credits : 2.0
Contact Hours : 28



Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes characterizing physical, chemical and other properties of materials that are commonly used in the ship's equipment and in the ship building process.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

- The production processes including an understanding on the behaviour and performance of materials in operational conditions;
- The basic constituents, relative strengths, and resistance to corrosion, weldability, magnetic properties and electrical conduction properties of materials.

Syllabus Contents:

- Basic Metallurgy, Metals and Processes
- Properties and uses of metals
- Non-Metallic Materials
- Process for fabrication and repair
- Heat treatment of carbon steel
- Materials under load: Tensile, compressive and shear stress
- Vibration
- Self-Secured Joints
- Permanent Joints
- Bonding Plastics
- Adhesives and Bonding: Health and safety; Joining plastics
- Pipe work

Recommended Text(s)

- Jackson, L and Morton, T.D. General Engineering Knowledge for Marine Engineers. 5th ed. London, Thomas Reed Publications Ltd 1990.
- H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann
- D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Radio Navigation and Communication Technology

Course code : ME 4113
Credit : 2.0
Contact Hours : 28
Assessment : Term end written examination and class tests



Faculty in charge :

Aims:

To familiarize students with the radio navigation and communication technology used on board the ship.

Learning Outcomes:

The student will be able to describe/identify/explain/discus:

Use of navigational lights and signals

Principles used in GPS, GMDSS, AIS, ECDIS and other navigational equipment.

Syllabus Contents:

Navigational Lights and Signals: Port and Starboard and aft mast light, Colours and Location. Look out, Precautions and Bad weather, Flags used on ships, Flag etiquette, Morse and Semaphore signaling, Sound signals.

Navigation: General knowledge of principle stars. Sextant, Navigation compasses, Echo Sounder, Log and uses, barometer and weather classification, G.M.T. and Zonal time, wireless Navigational Instruments, radar satellite Navigation etc.

Operation and maintenance of GPS.

AIS: AIS Concepts, AIS Data, AIS Ship Installation, Use of AIS at sea.

GMDSS: Fundamentals of radio systems, Familiarization with radio communication equipment, microprocessors, PC software and hardware, electronic navigation aids, ship-borne radar and ARPA, Maintenance of ship-borne GMDSS equipment.

ECDIS: Legal aspects and requirements, Familiarization with the principal types of electronic chart, ECDIS data, basic navigational functions and settings etc.

Magnetic Compass, Gyro compass, speed logs, eco-sounders: the principle, operation and limitations

Recommended text(s):

The Navigation control Manual – Bole, Dinely & Nocholis

Marine Electronic Navigation – S. Appleyard

Practical Electronics Handbook – L.Sinclair & J Dunton

Electronics Navigation System – L Tettly & D Calcut

Use of visual Aids to navigation – ND Squire

Electrical Installation and Instrumentation

Course Code : ME 4115

Credits : 3.0

Contact Hours : 42



Assessment : Term end written examination and class tests

Faculty in Charge :

Aims:

To provide an understanding on the basic concepts, principles and processes and procedures of electrical installation of equipments and various measuring devices and calibration processes.

Learning Outcomes:

The student will be able to describe/identify/explain/discus:

Domestic and industrial electrical services;

Wiring system design, drafting, and estimation;

Design for illumination and lighting;

Electrical installations system design: substation, BBT and protection, air-conditioning, heating and lifts. Design for intercom, public address systems. Design of security systems, fire Alarm, smoke detector, burglar alarm, and sprinkler system.

Syllabus Contents:

High voltage installation: Definition of high voltage, characteristics, generation, uses, installation, safety issues.

Lighting installation: principle of incandescent lamp, fluorescent lamp, tungsten-halogen lamp, gas discharged lamp, installation of various lamps .

Cable installation: Types of cable, material, superconductor, insulation system, insulation handling, dependence of insulation on various parameters, protection, installation of various types of cables.

Battery installation: Principle, Design of D.C loads, Battery handling, Installation, precautions.

Transducer: Electro-pneumatic, Electro-hydraulic transducing system, closed loop and open loop system, Wheatstone bridge system as transducer, variable inductance and capacitance transducer, I-V transducer.

Measuring system: Instrument transformer, Clamp meter, Megger system, Earth resistance measuring, R.P.M measuring, Continuity tester, Multi tester.

Electrical hazards and safety issues

Recommended Text(s):

Introduction to High Voltage Engineering by Subir Roy

Practical Marine Electrical Knowledge, Witherby and CO Ltd,1984

Reed's Instrumentation and Control System, Leslie Jackson,1992

Electrical Installation and Instrumentation Sessional

Course Code : ME 4116

Credits : 1.0

Contact Hours : 28



Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a practical understanding on the basic concepts, principles and processes and procedures of electrical installation of equipments and various measuring devices and calibration processes.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss with practical demonstration:

- Domestic and industrial electrical services;
- Wiring system design, drafting, and estimation;
- Design for illumination and lighting;
- Electrical installations system design: substation, BBT and protection, air-conditioning, heating and lifts. Design for intercom, public address systems. Design of security systems, fire Alarm, smoke detector, burglar alarm, and sprinkler system;
- Design problem on a ship.

List of Experiment:

- Familiarization with different types of tools and their use.
- Familiarization with different kinds of wire, wire joint.
- To learn about wire size estimation and calculation.
- To learn about different types of installation of wiring system.
- To learn about different types of lighting accessories.
- To learn about different types of protective devices and their working principle.
- To learn about electrical earthing and neutral wiring system.
- Familiarization with the symbol of electrical wiring, fitting and fixture and conduit layout.
- To learn about a system drawing and load calculation -1
- To learn about a system drawing and load calculation -2
- Demonstration of various types of transducer of Engine , Alternator ,Boiler.
- Demonstration of measuring devices and measuring techniques.

Recommended Text(S):

- Introduction to High Voltage Engineering by Subir Roy
- Practical Marine Electrical Knowledge, Witherby and CO Ltd, 1984
- Reed's Instrumentation and Control System, Leslie Jackson, 1992

Engine-Room Simulator

Course Code : ME 4118
Credits : 2.0
Contact Hours : 56
Assessment : Attendance, Practical Demonstration, Quiz, Viva voce



Faculty in charge :

Aims:

This Course is essentially a practical one, consisting of a series of exercises structured around the operation of a ship's machinery installation and carried out in conjunction with an engine-room simulator

Learning Outcomes:

The student will be able to describe/identify/explain/discuss with practical demonstration:

- Engine room equipment familiarization
- System layout and flow diagrams
- Control system and automation, Alarm and safety system
- Watch-keeping and troubleshooting
- Emission control and fuel economy management
- Energy management
- Emergency operations
- Vessel resource management

Simulator Experiments:

- Description of basic engine functions and their simulation study of Engine running under simulated conditions.
- Manual method of engine operation from engine room station.
- Engine Operation from Remote stations -i.e. engine control room and Navigation bridge.
- Safety and interlocks in UMS-ships and effect of malfunction of main engine auxiliaries.
- Electronic logic circuits in remote control stations. Simulation of engine functions in logic circuits. Study and adjustments of logic circuits for remote control operation of main engine and trouble shooting. Interfacing input/output interfacing and pneumatic interfacing in the system.
- Role of classification societies with reference to UMS-ships.
- Trouble shooting of engine malfunctions.

Recommended Text(s)

International Maritime Organization. (2002). *STCW .7/Cir 13, Issues to be considered when integrating computer-based technologies into the training and assessment of seafarers*. London: Author.



Section: 9

Course Description: 4th Year 2nd Term

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

Professional Ethics

Course Code : ME 4201
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes of ethical values with emphasis on professional conduct as seafarer as well as marine engineer.

Learning Outcomes:

On successful completion of this course, the students will

- Understand the moral values that ought to guide the Marine profession;
- Resolve the moral issues in the profession; and
- Justify the moral judgment concerning the profession. It is intended to develop a set of beliefs, attitudes, and habits that mariners should display concerning morality.

Syllabus Content:

Chapter 1 – Human Values

- 1.0 Objectives
- 1.1 Morals
- 1.2 Values.
- 1.3 Ethics
- 1.4 Integrity
- 1.5 Work ethics
- 1.6 Service learning
- 1.7 Virtues
- 1.8 Respect for others
- 1.9 Living peacefully
- 1.10 Caring
- 1.11 Sharing
- 1.12 Honesty
- 1.13 Courage
- 1.14 Valuing time
- 1.15 Cooperation
- 1.16 Commitment
- 1.17 Empathy
- 1.18 Self-confidence
- 1.19 Challenges in the work place
- 1.20 Spirituality

Chapter 2 – Engineering Ethics

- 2.0 Overview
- 2.1 Senses of engineering ethics
- 2.2 Variety of moral issues



- 2.3 Types of inquiries
- 2.4 Moral dilemma
- 2.5 Moral autonomy
- 2.6 Moral development (theories)
- 2.7 Consensus and controversy
- 2.8 Profession
- 2.9 Models of professional roles
- 2.10 Responsibility
- 2.11 Theories about right action (Ethical theories)
- 2.12 Self-control
- 2.13 Self-interest
- 2.14 Customs
- 2.15 Religion
- 2.16 Self-respect
- 2.17 Case study: Choice of the theory

Chapter 3 – Engineering as Social Experimentation

- 3.0 Engineering as experimentation
- 3.1 Engineers as responsible experimenters
- 3.2 Codes of ethics
- 3.3 Industrial standards
- 3.4 A balanced outlook on law
- 3.5 Case study: The challenger

Chapter 4 – Safety, Responsibilities and Rights

- 4.0 Safety definition
- 4.1 Safety and risk
- 4.2 Risk analysis
- 4.3 Assessment of safety and risk
- 4.4 Safe exit
- 4.5 Risk-benefit analysis
- 4.6 Safety lessons from 'the challenger'
- 4.7 Case study: Power plants
- 4.8 Collegiality and loyalty
- 4.9 Collective bargaining
- 4.10 Confidentiality
- 4.11 Conflict of interests
- 4.12 Occupational crime
- 4.13 Human rights
- 4.14 Employee rights
- 4.15 Whistle blowing
- 4.16 Intellectual property rights



Chapter 5 – Global Issues

- 5.0 Globalization
- 5.1 Multinational corporations
- 5.2 Environmental ethics
- 5.3 Computer ethics
- 5.4 Weapons development
- 5.5 Engineers as managers
- 5.6 Consulting engineers
- 5.7 Engineers as expert witness
- 5.8 Engineers as advisors in planning and policy making
- 5.9 Moral leadership
- 5.10 Codes of ethics

Recommended Text(s):

A text Book on Professional Ethics and Human values – R.S.Naagarazan
Professional Ethics in Engineering – William Frey
Engineering Ethics- Concepts, Viewpoints, Cases and Codes
[Ethics and Excuses: The Crisis in Professional Responsibility](#) By Banks McDowell
[Just a Job? Communication, Ethics, and Professional Life](#) By George Cheney; Daniel J. Lair; Dean Ritz; Brenden E. Kendall
[A Global Standard for Professional Ethics: Cross-Border Business Concerns](#) By Allen, Catherine; Bunting, Robert
[Talking Virtue: Professionalism in Business and Virtue Ethics](#) By Blackburn, Margaret; McGhee, Peter
[Conflict of Interest in the Professions](#) By Michael Davis; Andrew Stark
[Virtue Ethics and Professional Roles](#) By Justin Oakley; Dean Cocking
[Preferred Strategies for Learning Ethics in the Practice of a Discipline](#) By Pettifor, Jean L.; Paquet, Stephanie
[Working Ethics: How to Be Fair in a Culturally Complex World](#) By Richard Rowson
[Professional Ethics and Civic Morals - Emile Durkheim](#)
[Ethics and Professionalism - John Kultgen](#)

Control Engineering-II

Course Code : ME 4203



Credits : 2.0
Contact Hours : 28
Assessment : Term end written examination, class tests
Faculty in Charge :

Aims:

To provide an understanding on the basic concepts, principles, processes and procedures used in 'Electronic Control Engineering' including design of automation system.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze the control mechanism in electronic control engineering including relay circuit unit, digital sequential control devices, Integrated Automation Control and Monitoring System (IACMS), Programmable Logic Controller (PLC), analogue/digital/computer PID Controller and computer programmable controller.

Syllabus Contents:

Electronic Logic Control : Binary, Octal, hexadecimal Numbers, Number Base Conversions, Complements, Binary Codes, Basic logic functions, Boolean Algebra, Canonical and standard forms, BCD numbers, Digital logic gates, Digital logic families (TTL,ECL,MOS). RAM, ROM, CPU.

Electronic Control Equipment: Relay, Programmable logic controller (P.L.C),PID controller, Controllable pitch propeller.

ON-OFF Control: Definition, characteristics, applications in various devices.

Proportional-Integral-Derivative (PID): Principle, Methodology, P,I,D, PI,PD and PID action.

Manipulator: Pneumatic, Electrical servo, hydraulic servo, position control of motor, stepper motor.

Control Mechanism: Level detector, Flow detection, Electronic Fuel control operation, Motor starting system(star, Delta, N-point starter, reverse forward, auto transformer starter, soft starter, slip ring motor starter, Ward Leonard drive)and control, speed and torque control by changing frequency, voltage,

Recommended Text(s):

M. Morris Mano, Digital Logic and Computer Design
Reed's Instrumentation and Control System, Leslie Jackson, 1992
Ronald J Tocci, Digital systems principle and application
D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemaan.

Basic Mechatronics

Course Code : ME 4205
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination, class tests
Faculty in Charge :

Aims:

To provide basic understanding on the technical aspects of mechatronics, robotics etc that have application in maritime field.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze the engineering technologies, such as mechatronics, robotics and automation, which presume professional abilities to integrate, conduct and lead complex engineering projects integrating ICT and hardware technologies for solving practical problems.

Syllabus Contents:

Integrated Circuit: 555 timer I.C, OP-Amp741.

Microprocessor: 8051, 8086 microprocessor interfacing, addressing, assembly language programming.

Micro-controller: PIC 16F877.PIC 16F877A architecture. Programming.

P.L.C: Siemens S7-200,300 module Ladder programming.

Shaft and Coupling: Rigidity and critical speed, design of keys and key ways, rigid and flexible coupling.

Springs and gears: Types of gear, springs under constant and varying loads.

CAM: Construction of CAM profile for a radial cam displacement, velocity, acceleration, uniform velocity.

Vibration: Free, forced, damped vibration. Absorption, torsional vibration of shaft.

Hydraulic and Pneumatic Controls: Hydraulic system and components, Pneumatic systems and components.

Conveyors: Types, design of belt, apron, screw, vibratory conveyor.

Recommended Books:

Introduction to Siemens P.L.C, By SIEMENS.

Teach yourself PIC Microcontroller, M. Amer Iqbal Qureshi

The Intel Microprocessor, Seventh edition, Barry.B.Brey

Ship Repair and Ship Building Technology

Course Code : ME 4207
Credits : 2.0



Contact Hours : 28
Assessment : Term end written examination and class tests
Faculty in Charge :

Aims:

To provide an understanding of the basic concepts, principles and processes relevant to ship Dry-docking and ship building technology.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

The basic principles in dry-docking including all the activities carried out in dry-dock and floating berth.

Ship building technology including mechanical and electrical works carried out in ship-yard.

Syllabus Contents:

Dry-docking:

Purpose and types of dry-docking
Docking plans
Types of blocks
Time period and budget for dry-docking
Safe dry-docking procedures
Lay period and list of repairs
Docking and undocking meetings
Vessels stability
Incident, accident, risk assessment and emergency preparedness
Role of Classification society in dry-dock

Ship Building Technology:

Type of ships: Commercial Vessel, Govt. Vessel, Research vessel -Their functions and zeometric property.

Ship design: GA, Lines plan, Stability, Longitudinal stability, Transverse Stability, Tank model test, speed ...etc

Detail Production Design: Shop drawings, nesting, modeling, part list, profile bending, material record, and Block division.

Fabrication of steel ships: Welding procedure, reading of production drawings, subassembly, assembly, block lifting, erection of blocks, outfitting etc.

Quality control: Inspection and test plan, NDT plan, tank test, dimension control etc.

Shipbuilding technology: Structural arrangement, Foundations of machineries, Definition of shipbuilding structural items and their construction; Structural strength, Load analysis, Material properties etc.



Installation of Ship machineries: Windlass, Capstan, Bollard, Anchor, Mast, gen set, Main Engine, Propeller, shaft, rudder, Steering gear, ventilation, motor, pumps, galley equipment, navigational equipments
Paint selection
Launching procedure
Sea Trial
Project management: Ship building project management

Recommended Text(s):

E.A Stokoe (1985), Ship construction for marine engineers.
Taylor, D.A. (Dr.) Merchant Ship Construction, 4th ed. London, Institute of Marine Engineers, 1998 (ISBN 0-408-01535-7)
Dry-docking and Shipboard maintenance: A guide to industry.

Control Engineering Sessional

Course Code : ME 4204



Credits : 1.0
Contact Hours : 28
Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a practical understanding on the basic concepts, principles, processes and procedures used in 'Electronic Control Engineering' including design of automation system.

Learning Outcomes:

This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts used in 'Electronic Control Engineering'. In second part, students will design simple systems using the principles learned in 'Electronic Control Engineering'.

List of Experiments:

- Familiarization with necessary resources of Digital Electronics Sessional.
- Familiarization with different Logic Gates and Implementation of basic logic gates by diodes, transistor and resistors.
- Implementation of Boolean function by basic logic gates.
- Introduction to P.L.C and Relay switching.
- Familiarization with counter circuit.
- Stable operation of pneumatic piston.
- Automatic Synchronizing and Interlocking operation of pneumatic piston.
- P.L.C Micro-controller based hydraulic and pneumatic devices operation demonstration.
- Tachometer based speed control.
- Automatic boiler control process design by P.L.C/Microcontroller.
- Rudder angle control by P.L.C/Microcontroller.
- Introduction to Simulation Software.

Recommended Text(s):

- M. Morris Mano, Digital Logic and Computer Design
- Reed's Instrumentation and Control System, Leslie Jackson, 1992
- Ronald J Tocci, Digital systems principle and application
- D.A Taylor, 2001, Introduction to Marine Engineering, Publisher: Butterworth and Heinemann.

Basic Mechatronics Sessional



Course Code : ME 4206
Credits : 1.0
Contact Hours : 28
Assessment : Attendance, Practical Demonstration, Quiz, Viva voce
Faculty in Charge :

Aims:

To provide a general understanding to verify practically the theories learned in Basic Mechatronics.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze practically the engineering technologies, such as mechatronics, robotics and automation, which presume professional abilities to integrate, conduct and lead complex engineering projects integrating ICT and hardware technologies for solving practical problems.

List of Experiments:

- Stepper motor interface.
- Servo motor interface.
- Lift control mechanism.
- CNC machine operation.
- CNC machine control system.
- Ignition system control of engine.
- Automobile controlling system.
- Different types of links and joints used in robots.
- Sensors interfacing to a device.
- Electronic governor control as per load.

Recommended Text(s):

- Introduction to Siemens P.L.C, By SIEMENS.
- Teach yourself PIC Microcontroller, M. Amer Iqbal Qureshi
- The Intel Microprocessor, Seventh edition, Barry.B.Brey



Section: 10

Course Description: Elective Subjects

**Aims;
Learning outcomes;
Syllabus contents; and
Recommended text(s)**

Advanced Oil Tanker Cargo Operation

Course Code : ME 4221
Credits : 3.0
Contact Hours : 42



Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide advanced, specialized training for those on board oil tankers who have immediate responsibility for loading, discharging and care in transit or handling of oil cargoes.

Learning Outcomes:

After successful completion of this course, the students will have sufficient knowledge on:

- The equipment, instrument and controls used for cargo handling on a tanker;
- The need of proper planning, the use of checklists and the scales involved in the various cargo handling operations;
- Applying proper and safe procedures at all times when carrying out the various operations on board an oil tanker;
- Identifying operational problems and solving them;
- Making decisions which promote safety and protect the marine environment; and
- Plan and co-ordinate actions during emergencies.

Syllabus Contents:

- Knowledge of oil tanker design, systems and equipment;
- Knowledge of pump theory and characteristics, including types of cargo pumps and their safe operation
- Proficiency in tanker safety culture and implementation of safety-management system
- Knowledge and understanding of monitoring and safety systems, including the emergency shutdown
- Loading, unloading, care and handling of cargo
- Knowledge and understanding of oil cargo related operations
- Development and application of cargo-related operation plans, procedures and checklists
- Ability to calibrate and use monitoring and gas-detection systems, instruments and equipment
- Ability to manage and supervise personnel with cargo-related responsibilities
- Knowledge and understanding of the physical and chemical properties of oil cargoes
- Knowledge and understanding of safe working practices, including risk assessment and personal shipboard safety relevant to oil tankers:
- Knowledge and understanding of oil tanker emergency procedures
- Actions to be taken following collision, grounding, or spillage
- Knowledge of medical first aid procedures on board oil tankers
- Understanding of procedures to prevent pollution of the atmosphere and the environment



Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL), as amended, and other relevant IMO instruments, industry guidelines and port regulations as commonly applied
Case Studies

Recommended Text(s):

ICS/OCIMF/IAPH, International safety Guide for Oil Tankers and Terminals, 4th edition, London: Witherby and Co. Ltd.

C. Baptist, Tanker hand Book for Deck officers, 7th edition, Glasgow: Brown Son & Ferguson Ltd.

International Chamber of Shipping, Safety in Oil Tankers, London: International Chamber of Shipping

H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher: Butterworth Heinemann

Teaching Aids:

Videotel Training DVD Tanker practices -Part 1

Videotel Training DVD Tanker practices -Part 2

Videotel Training DVD Inert Gas Systems

Videotel Training DVD Crude oil washing systems

Advanced Chemical Tanker Cargo Operation

Course Code : ME 4223

Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide specialist training in subjects appropriate to the duties of senior officers and any person with immediate responsibility for loading, discharging, care in transit or handling of bulk chemical cargoes..

Learning Outcomes:

After successful completion of this course, the students will have sufficient knowledge on:

Chemical tanker designs, systems, and equipment;
Pump theory and characteristics, including types of cargo pumps and their safe operation;
Tanker safety culture and implementation of safety management system
Ability to perform cargo measurements and calculations
Development and application of cargo-related operation, Plans, procedures and checklists
Ability to calibrate and use monitoring and gas-detection, Systems, instruments and equipment.

Syllabus Contents:

Introduction (STCW Regulation V/1-1 para 6, Code Table A-V/1-1- 3)
Chemistry and Physics
Hazards and control measures Chemistry and Physics
Rules and Regulations
Chemical tanker Design and Cargo Containment
Cargo-handling Systems
Occupational health and Safety and Pollution Prevention
Loading, unloading, care and Handling of cargo
Tank-cleaning Operations
Ship/Shore Interface
Response to Emergencies

Recommended Text(s):

ICS/OCIMF/IAPH, International safety Guide for Oil Tankers and Terminals, 4th edition, London: Witherby and Co. Ltd.
International Chamber of Shipping, Tanker Safety Guide (Chemicals), 2nd edition, London: Witherby and Co. Ltd.
International code for the construction and equipment of ships carrying dangerous chemicals in Bulk (IBC code), as amended.



H.D McGeorge, 1992, General Engineering Knowledge, 3rd Edition, Publisher:
Butterworth Heinemann

Maritime Economics

Course Code : ME 4225



Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To review the fundamentals of economics, to present the basic concerns and special features of transport and maritime transport, and to apply economic principles to maritime transport

Learning Outcomes:

The students will be able to:

- Discuss the demand/supply aspects of shipping and its relationship to world trade.
- Understand how the major shipping markets operate and identify significant problems associated with them.
- Explain the meaning of common maritime economic and commercial terms.

Syllabus Contents:

Introduction to maritime Economics: Economic concepts; economics concerns; questions that maritime economics provides answers to; Maritime Transport Market; Main Characteristics of International Shipping; Factors of Production; Basic trade theory; Contributors to Trade Growth.

Demand of Maritime Transport: the structure of seaborne Trade, the features maritime demand

Sea trade evolution and Maritime Geography: The evolution of seaborne trade, the factors that affect maritime demand, the geographic features of maritime demand, Economic concept- Price elasticity of demand and supply

Supply of Maritime Transport: Factors regarding the size of supply, the structure of maritime supply and its evolution, the economics of ship's size and speed, the current supply in terms of major suppliers of various shipping services, Economic concepts: Economies of scale, Productivity and optimization and Laws of diminishing return

Types of Shipping Organization: The economic reasons for having different shipping organizations, the major features of tramp shipping and liner shipping, Economic Concepts: Market equilibrium under competition and monopoly, Maritime Cooperation and other related services.

Maritime Cooperation and Other Related Services: The main forms and features of maritime cooperation, the basic functions of a port and the relationship between port and shipping, the roles of shipping intermediates, Economic Concepts: Principle of substitution



Maritime transport cost and financing: The capital requirement of shipping, the major financing options and their main features, the concept of opportunity cost and the marginal utility theory, Economic Concept: Opportunity cost, Marginal utility.

Cost analysis: The running cost aspect of shipping companies, the basic cost structure of various shipping organizations, the economic concepts and principles regarding shipping cost and pricing, Economic Concepts: Fixed cost and variable cost, Marginal cost

Maritime freight market: The basic structure of maritime freight of both liner and tramp market, economics of freight market, the dry bulk freight index system and future market for maritime freight, Economic concepts: Perfect competition, monopolistic competition and monopoly

Economics of maritime regulations: The regulatory framework of maritime transport, the economics of shipping regulations, the economic implications and benefits of maritime regulations, Economic Concepts: Property right and externality, Market-based control measures

Recommended text(s):

Shuo Ma (2013) Maritime Economics, Malmo: WMU

Lipsy R. (1995), An introduction to Positive economics, London: Weidenfeld Paperbacks.

Stopford M (2008), Maritime Economics, 3rd edition, London: Routledge

Maritime Safety and Environmental Administration



Course Code : ME 4227
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide comprehensive understanding of maritime safety administration activities in the context of IMO and essential management tools required to implement safety, security and environmental protection standards.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

Policy implementation on maritime safety and security domains, occupational health and safety as well as marine environmental issues;

Maritime administration activities in the context of IMO and essential management tools to implement safety, security and environmental protection standards.

Syllabus Contents:

Introduction to IMO Member State Obligations: The role of government in policy formulation and the administration of maritime affairs. To define and examine “maritime administration” conceptually. An overview about IMO member State obligations as flag, port or coastal State under the IMO III Code. To introduce the IMO member State auditing scheme as a tool to assess Member State performance.

Maritime Risk Management: Safety and risk, including risk assessment, safety and Formal Safety Assessment (FSA). The relationship between risk assessment and maritime casualty investigation. Essential tools for the consideration of all relevant factors involved in the development of maritime accidents, such as human and organizational factors.

Maritime Human Element: the relevant IMO and ILO instruments, including the MLC 2006, relating to maritime labour and welfare, and in particular the rights and expectations of seafarers in relation to occupational safety.

Marine Environmental Protection: Marine environmental protection and coastal and ocean governance in a context broader than shipping and the maritime sector. Sources of pollution, the science, mechanisms and technologies for pollution monitoring and control. The importance of emergency preparedness measures and contingency planning as part of the overall risk management process.

Shipboard Issues in Maritime Safety and Marine Environmental Protection: Key aspects of design for safety principles and relate them to SOLAS requirements. Marine



environmental operational issues and measures necessary to protect the marine environment as required by MARPOL, such as ballast water management, bio-security, anti-fouling systems and the recycling of ships.

Recommended Text(s):

Churchill, R.R. & Lowe, A.V. (1999). *The Law of the Sea* (3rd. ed.).

Manchester: Manchester University Press.

SOLAS'74 as amended

MARPOL 73/78 as amended

International Labour Organization. (1996). *Accident prevention on board ship at sea and in port*, pp.1-134. Genova: International Labour Office.

International Labour Organization. (2006). *Maritime Labour Convention, 2006*. Geneva: Author.

Supply Chain Management



Course Code : ME 4229
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide the concepts, principles and techniques for managing manufacturing and service operations emphasizing decision making in operation function of organizations and supply chains.

Learning Outcomes:

After successful completion of this course, the students will be able:

- Develop the ability to identify, understand and evaluate the operations component of a variety of manufacturing and service organizations.
- Develop a process view of the organization/supply chain.
- Understand the issues in process, quality, capacity and inventory.
- Planning and scheduling method.

Syllabus Contents:

Introduction: Meaning and nature of supply chain and supply chain management; importance of supply chain management; drives of supply chain competitiveness; strategies-tactics-mission-goal-factors of competitiveness; quality and time based strategies.

Demand forecasting: Concept of forecasting and demand forecasting; elements of good forecast; steps in forecasting; approaches to forecasting; qualitative and quantitative approach to forecasting; time series-naive method-moving average-exponential smoothing.

System design: Product design-meaning-importance-phases in product design & development-service design-challenges of service design. Need for capacity planning; capacity strategy steps.

Facility location: Nature, meaning, importance, factors affecting location of manufacturing and service organization; facility location decisions

Facility layout: nature-objectives-types of layout; features of good layout for manufacturing and service organization; designing product and process layout.

Supply Chain Management: Purchasing-purchasing cycle; ethics in purchasing-value analysis-outsourcing; advantages and disadvantages of outsourcing; vendor selection; supply chain strategy; logistics management.

Inventory management: Concept of inventory-types-objectives of inventory-inventory control-cost of inventory. Inventory control models; safety stock-material requirement planning; problem solving.

Managing quality: Meaning of quality-dimensions of product quality and service quality-



quality control technique-cost of poor quality; Total quality management-elements of TQM.

Aggregate planning: Meaning and nature of aggregate planning; technique and steps in aggregate planning; master production scheduling.

Operations Scheduling: Nature and meaning-demand scheduling-workforce scheduling-operations scheduling-forward scheduling-backward scheduling-scheduling criteria; dispatching-priority sequencing rule; linking operations scheduling to the supply chain.

Project management: Project management planning-project scheduling techniques.

Recommended Text(s):

1. William J. Stevenson, Operations management.

Integrated Coastal Zone and Marine Fisheries Management



Code : ME 4231
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide in-depth knowledge on the management of the coastal zone using an integrated approach regarding all aspects of the coastal zone, including geographical and political boundaries in an attempt to achieve sustainability. This course will also discuss on the marine fisheries and aqua culture management.

Learning Outcomes:

Students will be able to describe/explain/discuss/analyze:

- Integrated coastal zone management concept, method and its implementation
- Marine Fisheries and its sustainability
- Management of aquaculture
- Development of blue economy

Syllabus Contents:

Coastal Zone Management:

- Integrated Coastal Zone Management concept and method
- Implementation of Integrated Coastal Zone Management
- Building harmonious and beautiful marine environment through integrated management of marine environment
- Promoting development and build a beautiful living environment through integrated management of Bay area.
- Development of blue economy and boost marine emerging industry.
- Promoting marine culture and enhance public conscious of maritime activities.
- The future plan of marine functional zones in Bangladesh
- Integrated Coastal Zone Management in various countries.

Marine Fisheries Management:

Marine Fishery: Introduction, importance and opportunities of Marine Fishery.

Marine Ecosystem: Features of sea floor, Ecological division of marine environment, concepts on sea shore, estuaries, mangroves and coral reefs. Marine food chains and food webs.

Fish & Shellfish Morphology & Classification: External feature, aims & methods of



classification.

Fish Migration: Definition, types, causes, significance and importance.

Fish Population Dynamics: Concepts, significance, population dynamics of fish.

Fishing ground detection: Aim & objectives. Fish school detection. Major fishing grounds of the Bay of Bengal.

Marine Resources: Meaning, Major exploited marine fisheries of Bangladesh, their developmental history and present status. Major minerals and their present exploitation rate in the Bay of Bengal.

Climate change & Sea level rise: Meaning, causes, effects on marine environment.

GIS and remote sensing: Definition, types, importance and application in marine capture fishery.

Aquaculture:

Aquaculture: Definition, objectives & importance.

Species & Site selection: Criteria for suitable species & sites.

Shore based aquaculture system: Traditional, semi-intensive, intensive aquaculture practice.

Methods of aquaculture: Rafts, racks, cages, poles and ropes.

Grower pond management: Pond Preparation, fertilization, culture operation & management.

Aquaculture Planning: Major aspects, required basic data.

Aquaculture Extension: Objectives, methods, awareness program.

Aquaculture Economics: Significance, cost management, economic return & economic appraisal evaluation.

Culture of live food organisms & Feed formulation: Biology and culture requirements of important live food organisms. Green algae, diatoms. Nutritional requirements of cultivable fish and shellfish and manufacturing method of fish feed.

Recommended Text(s):

Coastal Zone management Handbook by John R. Clark

Perspective on Integrated Coastal Zone Management by W. Salomons and R.K Turner.

Coastal Zone Management, David R. Green, University of Aberdeen

Global Challenges in integrated coastal zone management, Dr. Erlend Moksness

Practical Hand book of Marine Science by Michael J. Kennish

Ichthyology by Karl S. Lagler

Prawn Aqua Culture by Marpoh

Applied Fisheries and Aqua culture by B.K Sing

Marine Offshore Technology



Course Code : ME 4233
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To familiarize students with marine offshore design, offshore oil and gas technology and offshore engineering.

Learning Outcomes:

Students will be able to describe/explain/analyze:

- The characteristics of the maritime offshore industry
- The important ship types and competencies needed to execute offshore operations.
- The design consideration of offshore structure.
- Technologies used in the off-shore oil and gas platforms

Syllabus Contents:

- History of the Maritime Offshore Industry
- Introduction to the oil and gas industry
- Maritime Offshore segments and ship types
- Planning, documentation and execution of various safe offshore operations
- Key rules and regulations related to the maritime offshore industry
- Vessel and installation types and operations
- Offshore operations
- Offshore logistics and supply chain
- Vessel and installation cooperation
- Human Factors
- Design criteria and loadings
- In-place analysis and code compliance
- Fatigue analysis
- Dynamic analysis
- Certification and inspection

Recommended Text(s):

- Ship-shaped offshore installations, Jeom Kee Paik, 2011, Pusan National University
- American Petroleum Institute, API RP2A (2000), Recommended Practice for Planning, Designing and Constructing Fixed Offshore Structures, 21st edition, Washington D.C., USA
- Subsea Engineering Hand Book, Author:Yong Bai, Qiang Bai, Publisher: Elsevier Science.

Maritime Law and Policy



Course Code : ME4235
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide the essential knowledge and understanding and gives in-depth appreciation and advanced knowledge of the law and policy related to international maritime transport.

Learning Outcomes:

The student will be able to describe/identify/explain/discuss/analyze:

The basic principles of maritime law within the wider context of law and legal systems
The basics of public international law, including law of the sea and the law of treaties
The legal framework of regulatory and private maritime law including the general law of contract, tort, property and remedies, and commercial maritime law, ship acquisitions, ownership and mortgages

Syllabus Contents:

Principles of Maritime Administration and International Institutions: The role of government in policy formulation and the administration of maritime affairs. An overview of the various international institutions involved in shipping and maritime affairs, including UN agencies and inter-governmental and non-governmental organizations and their interrelationships.

Law of the Sea: The international legal framework for the oceans, including the regimes of maritime zones under the UN Convention of the Law of the Sea (UNCLOS) from the perspective of maritime administrations and their particular interests.

Maritime Security: The importance of maritime security in the current context and to afford an understanding of the developing regime under different initiatives taking place under the aegis of IMO instruments and UNCLOS.

Maritime Human Element: The relevant IMO and ILO instruments, including the MLC 2006, relating to maritime labour and welfare, and in particular the rights and expectations of seafarers in relation to occupational safety.

Maritime Commercial Law: Commercial law and policy, including marine insurance and general average, carriage of goods by sea under charter parties and bills of lading, and international trade law. To provide an understanding of the law relating to the maritime claims and their enforcement, arrest of ships, and liens and mortgages.



Law and Policy Related to the Marine Environment: The public and private law of marine pollution including UNCLOS and various public, regulatory and private law conventions, the penal law of marine pollution, and the laws of wreck and salvage, towage and pilotage.

Recommended Text(s)

- Y. Baatz, N. Debattista et al (2008), *Southampton on Shipping Law*. London: Informa Law
- Churchill, R.R. & Lowe, A.V. (1999). *The Law of the Sea* (3rd. ed.). Manchester: Manchester University Press.
- Grime, R. (1991). *Shipping Law* (2nd ed.). London: Sweet & Maxwell Ltd.
- Hill, C. *Maritime Law*, (6th ed.) LLP, London
- IMO: SOLAS Consolidated Edition 2009. London: IMO
- Mukherjee P.K. (2002), *Maritime Legislation*, WMU Publications, Malmö: WMU
- Starke J.G. (1989) *Introduction to International Law* (10th ed.) Butterworths, London
- UNCLOS (1982), UN, New York
- University of Southampton (1990), "The Ratification of Maritime Conventions" Vol.1-4 LLP, ISBN1-95044-301-7

Marine Insurance and Risk Management



Course Code : ME 4237
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide a comprehensive understanding of marine insurance principles and practice, marine insurance cover for property and liabilities, and comparison of standard policy conditions in various insurance markets. To analyze the concept of ship-owners' liability, limitation of liability regimes and enforcement of maritime claims.

Learning Outcomes:

Students will be able to describe/explain/discuss/analyze:

- The fundamental concepts of risk, loss and insurability of risk and fundamental principles of marine insurance law
- Different types of marine risks and insurance cover for such risks
- Principles of ship-owners liability and application of different limitation regimes
- Enforcement of maritime claims and arrest of ships

Syllabus Contents:

Introduction: Origins, Lombard and Hanseatic initiatives, Establishment of the English Marine Insurance market, Lloyd's, Insurance companies and hull clubs, third party liability coverage, UK marine insurance act 1906.

Basic Principles and features: Definitions and terminology, distinctive features, Different types of marine insurance: Hull and machinery insurance, Loss of hire, protection and indemnity insurance, defence cover, war- risk insurance, cargo insurance, other market cover, reinsurance; Brokers and managing general agents.

Marine insurance doctrine: Disclosure and utmost good faith, insurable interest, measure of indemnity, subrogation and abandonment, warranties, perils of the sea.

The marine insurance policy: Background, time and voyage policy, marine insurance policy clauses: navigation clause, continuation clause, breach of warranty clause, sale of vessel or termination clause, notice of assignment clause, perils clause, pollution hazard, three quarters collision liability, sister ship clause, duty of assured clause, unrepaired damaged clause, disbursement clause, free capture and seizure clause, risks clause, transit clause, seaworthiness admitted clause, duty of the assured clause, other cargo clause.

Protection and indemnity insurance: Background, P&I club operation and membership, non-club protection and indemnity cover, risk coverage: protection and



indemnity cover, other risks

Recommended text(s):

Edgar Gold, Aldo Chircop and Hugo Kindred (2003), Maritime Law
Hudson, N.G., Madge, T. and Sturges, K. (2012). *Marine Insurance Clauses*
London:Informa Law.
Astle, W.E. (1985). *Limitation of liability*. London: Fairplay Publications Ltd.
Bennett, H. (1996). *The Law of Marine Insurance*, Oxford: Oxford University Press.
Berlingieri, F. (Ed.). (1990). *Essays on maritime legislation. Volume I-II*. ESCAP.
Berlingieri, F. (2000). *Berlingieri on arrest of ships* (3rd ed.). London and
Hong Kong:Lloyd's of London Press.

Shipping Management

Course Code : ME 4039



Credit Hours : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

The course provides advanced knowledge of shipping management, types of ship management structures, measurement of strategic performance, and the identification of strategic challenges in shipping.

Learning Outcomes:

By the end of the course, students will be able to develop/appraise/analyze/implement:

- Organizational structures and major activities in shipping companies
- Strategic ship management processes
- Influences of regulatory and economical constraints on ship management
- Key strategic issues in decision-making, within all sectors of the shipping industry
- Strategic performance measurement, including KPIs
- The risk-return trade-offs and the sources of business risks in ship management
- Risk management strategies, with the use of shipping derivatives

Syllabus Contents:

- Generic organizational structure of shipping companies
- Ship & Fleet management defined, the basic principles & key components
- Managing Money & Relationships
- Managing People & Technology
- Managing Information & Risks/Reputation
- Characteristics of main ship management
- The strategic management process in shipping
- The operating costs of running ships
- The concept and sources of business risks in shipping
- Vessel portfolio strategy of shipping companies
- Chartering portfolio strategy of shipping companies
- The use of derivatives for risk management in shipping
- The underlying Baltic Exchange freight indices and freight derivatives
- Risk management practical examples in the dry-bulk, tanker and containership sectors
- Bunker fuel risk management
- Vessel value risk management
- Balanced scorecard framework in shipping.
- Key Performance Indicators (KPI) in shipping.

Recommended Text(s):

Lorange, P. (2009), Shipping Strategy: Innovating for Success, Cambridge University Press, UK.



Kavussanos, M. and Visvikis, I (2006), Derivatives and Risk Management in Shipping, Witherbys Publishing and Seamanship International, UK.

Willingale, M. (2005), Ship Management, 4th Edition, Informa Business Publishing, UK.

Energy Management and Innovation in the Maritime Industry

Course Code : ME 4241



Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To develop knowledge and general understanding of basic energy management and efficiency, renewable energy and innovation concepts relevant to shipping, ports, shipyards and offshore structures.

Learning Outcomes:

The student will be able to apply perform, describe, explain, discuss and analyze:

Existing and potential future maritime energy related legislation for shipping, ports and shipyards

Innovation theory and life-cycle analysis as well as payback analysis

Technological innovation in the maritime industry

Ship design and energy efficiency

Ship operation and energy management and efficiency

Renewable energy and alternative fuels

Syllabus Contents:

Triggers for shipping innovation and Innovation models in maritime industry and life-cycle analysis

Ship design and innovation

Energy efficiency and emissions

IMO relevant legislation and onshore facilities related rule governance for energy management

Sulphur reduction targets and abatement technologies, SECA and ECA

Energy efficiency and ship resistance; hull form optimization, air lubrication, patterned surfaces

Energy efficiency and ship propulsion; Hull-propeller interaction, PIDs, propeller coating, flow improvement devices

Advanced marine vehicles; Hydrofoils, SWATHs, Catamarans

Energy consumption onboard a ship

Energy efficient ship operations; trim optimization, weather routing, ballast water management, systems planning, e-navigation

Solar and wind energy and their applications

Alternative fuels (biofuels, LNG) and fuel cells

Recommended Text(s):

1. The Naval Architect, RINA (Royal Institution of Naval Architects) Publication



The MER, The IMarEST (The Institute of Marine Engineering, Science & Technology) Publication

Shipping innovation, by Wijnolst, N; Wergeland, Tor; Levander, Kai,

Publisher: Amsterdam : IOS Press, 2009, ISBN: 9781586039431

Marine engineering and technology : proceedings of Martech 2011, 1st International Conference on Maritime Technology and Engineering, Publisher: Leiden, the Netherlands: CRC Press, 2012, ISBN:9780415621465; 0415621461

Dredger and Dredging Technology



Course Code : ME 4243
Credits : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To introduce student with the dredger and technologies used in dredging.

Learning Outcomes:

The student will be able to apply perform, describe, explain, discuss and analyze:

- Operational aspects of dredgers.
- Different type of dredging technology
- Dredging needs in Bangladesh

Syllabus Contents:

Introduction: Historical review, the importance of dredging
Development of dredging equipment: The dredging bail, the scratcher, the underwater scraper, mud mills and bucket wheels etc
Different types of dredging
Hydraulic and mechanical dredger types: drilling pontoon, deeper dredger, backhoe method, bucket dredger, grab dredger, cutter suction dredger, trailing suction hopper dredger, dustpan dredger, special purpose dredger etc.
Cutter suction dredger: design features, types of cutter, design of ladder, performance parameters, positioning system. Dredging calculation: estimating discharge-head, effect of dredge material characteristics, pump performance characteristics, estimation of output of various types of dredging. Special features of dredge pump. Types of floaters. Pipeline fittings. Brief review of dredging operation, dredging needs in Bangladesh.

Recommended Text(s):

Handbook of Dredging Engineering, 2nd Edition Writer: John B. Herbich
Dredging Engineering Writer: Fred Lester Simon

Shipyard Management



Course Code : ME 4245
Credit : 3.0
Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To give a clear overview of the various types of ships available, managing shipyard production processes, financial issues and their correlation to shipyard operations.

Learning Outcomes:

- Understand the various stages of a shipbuilding contract and the main processes required
- Examine and assess the different stages in ship design - early contract design, procurement issues, post contract, ship functions, design approval and production needs
- Learn how to plan the ship construction project schedule and meet procurement needs successfully
- Understand and compare the differences between ship construction from ship repair and conversion activities
- Apply appropriate planning & strategies for all stages and events across short to medium term shipyard projects
- Manage various shipyard production processes effectively - steel structure production, material cutting & forming, unit and block assembly, machinery and hull outfitting, system testing and commissioning

Syllabus Contents:

- Organizational Structure
- Responsibility and accountability chain.
- Management: structure and style.
- Trade union: legal rights and collective bargaining
- Factors related to job satisfaction and dissatisfaction
- Performance appraisal.
- Shipbuilding: phase-wise work contents, initial estimation- procedures and practice,
- Contract Management and Mis-Management - multiple case studies and lessons learned.
- Contract Performance Documentation - basic work, change work, extra work and re-work.
- Change Orders - advance establishment of approval procedures and time constraints, identifying constructive, negotiated, unilateral and other CO's, identifying the down-side risks of CO's
- Critical Path - 'Real-time' identification of changes, slippages and re-routing.



Information flow, agreements. Handling of material and material flow. Plant location: layout and construction, plant safety
Material and technological constraints
Alternative designs and acceptance of a compromise design.
Post-production assessment for future guidance

Recommended Text(s):

Cost Management in Shipbuilding: Planning, Analyzing and Controlling Product Cost in the Maritime, Writer: Jan Fischer

Port & Harbour Engineering

Course Code : ME 4247
Credit : 3.0



Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide knowledge on various aspects of port and harbour engineering including planning, design, and economic issues

Learning Outcomes:

Students will be able to: Explain basic concept of port planning design and various type of port

Student will be able to analyse data used for planning and design, Design port infrastructure (waterway, access channel, turning basin, etc.) in water area, design port facility for berthing vessels (fender etc.), and area needed for loading/ unloading storage are, explain method of port operation.

Demonstrate the ability to utilise a systems approach to port and harbour applications as a part of coastal and civil engineering

Syllabus Contents:

Basic idea of port and harbour structures

Classification of Harbour

Port and Harbour Management

Port Facility

Port Planning and Design

Port operation and maintenance

Port facilities: Berthing and mooring structures and rendering systems

Operational and environmental loads

Wave oscillations in harbour and its control

Manoeuvring of ships within harbour

Cargo handling in ports. Offshore mooring- design of breakwaters, jetties, wharfs, quays, diaphragm walls, slipways and docks. Sediment transport and maintenance dredging in harbours

Recommended Text(s):

Port and Harbour Engineering, Volume 6, Writer: Adrian Jarvis

Handbook of port and harbour engineering: geotechnical and structural aspects Writer: S Cowdell, M Isaacson

Marine Surveying and Casualty Investigation

Course Code : ME 4249
Credits : 3.0



Contact Hours : 42
Assessment : Term end written examination and Class tests
Faculty in Charge :

Aims:

To provide knowledge on marine surveying and casualty investigation such that students may perform such duties as required.

Learning Outcomes:

The student will be able to apply perform, describe, explain, discuss and analyze:

- Laws and conventions concerning marine surveying;
- Technical skills of marine surveyor;
- Items to be checked during survey;
- Principles of marine casualty investigation;
- Procedures to carry out accident investigation

Syllabus Contents:

- Introduction to Marine Surveying
- Relationship between Surveyors and their Clients
- Business Skills for Surveyors
- Laws and Conventions relating to Marine Surveying Marine Surveying and Insurance
- The Surveyor's Role in Incident and Accident Investigation
- Naval Architecture for Marine Surveyors
- Marine Engineering and Systems for Surveyors
- Hull and Structural Surveys
- Safety and Security Surveys
- Non-Liquid Cargo Surveys
- Liquid Cargo Surveys
- Super yacht Surveys
- Marine Environmental Surveys
- Marine Engineering and Systems Surveys
- International Safety Management (ISM) Code Surveys
- Marine Warranty Surveys
- Mobile Offshore Drilling Unit Surveys
- International legal basis for marine accident investigations
- International Safety Management (ISM) Code and accident investigation
- Managing a marine accident investigation
- Marine accident site risk assessment and hazard identification
- Evidence preservation and collection issues in common marine accident scenarios
- Advanced interview techniques
- Human performance and human factors in marine accidents
- Human factors analysis and classification tools



Collision, contact and grounding accidents
Ship fires
Ship structural failures, loading and stability problems
Mechanical failure and maintenance error accidents
Marine occupational health and safety accidents

Recommended Text(s):

Surveying Marine damage, 2nd edition, Thompson
Container ships: Guide lines for surveys, assessment and repair of hull structure. Author: IACS
Guidance manual for Tanker structure, Author: IACS
Reeds Marine Surveying, 2nd edition, Author: Thomas
Commercial vessel casualty reporting & regulation, Author: ACE Marine

