INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1601	**MOTOR ENGINEERING KNOWLEDGE** **PAPER - 5** **UG22T2601**	**54 hrs.**

Theory – 50 marks

Unit 1 : Automation

Automation in diesel engine plant and safety devices, cooling control, bridge control, safety interlocks, wrong way alarm etc. Remote operation, Alarm and fail safe system, governors and their basic functions Constant speed and Over-speed trips. Constructional details and hunting of governor. Load sensing & speed sensing governors, Computerised monitoring and diagnostic applications in propulsion engines. The intelligent engine concept. Planned and Condition based maintenance. Temperature controllers.

Unit 2 : Likely Defects/ Failures in Diesel Engines

Forces and Stresses : Engine Balancing, overloading, Different type of vibrations & its

effects, A/F vibration. running clearances; critical speeds; torsion in crank-pins; movement of crankshaft in bearings; engine balancing; engine chocking; bolt tightening; stress effects of tightening-up and working loads , creeping cracks; heat cracks; welding failures; casting strains, corrosion fatigue , stress corrosion cracking; stress concentration at fillets.

Unit 3 : Maintenance and Overhaul of Diesel Engine Machinery and components

Inspection and overhaul of the diesel engine machinery components ; gauging clearances, measuring crankshaft deflections, adjustments of bearing clearances, adjusting the fuel injection pump; inspection of the fuel injection valve, priming the fuel injection system; fuel oil system; tightening of piston rod nuts, connecting rod bolts, cylinder head nuts, tie rods, timing of cylinder lubricating oil pump; chain drive and likely trouble areas ; vibrations and noise ; record of engine behaviour.

PRACTICAL

Code No. : P1601 Practical : 36 hrs.

1. To carryout dismantling of a unit (isolating the cylinder unit, removing the cylinder head and mountings, removing the piston/connecting rod assembly of a medium or high speed engine. Inspect the components and furnish a report.
2. Measure the diameter of the cylinder liner, and gauge the piston ring grooves and piston rings.
3. Pressure test and set fuel injector pressure.
4. Dismantle and overhaul M. E Exhaust valve .
5. Start a diesel engine and study the performance .
6. Checking timing of a fuel pump
7. Study crankcase relief door .
8. Study operation of cylinder lubricator .
9. Trace cooling water system of an engine and study cooling water temperature controller operation
10. Start a diesel engine and study the performance .
11. Study crankcase mist detector .
12. Study operation of fuel oil viscosity controller .
13. To carryout dismantling of a turbocharger and assemble the same again. Measure all clearances and explain their significance .
14. Trace L.O system of a diesel engine .
15. Computer Software Applications.

NOTE :

1. Evaluation will on a continuous basis during the practical, on the ability to carryout the above tasks competently with demonstration of safe techniques.
2. There will be continuous assessment of skills being acquired through class-work, practicals and periodic assignments / project works / tests / orals etc.
3. Workshop journal to be submitted for assessment at the end of each term .
4. At least 13 tasks to be performed by every student

REFERENCE BOOKS :

J.K.Bowden; Sothern's Marine Diesel Oil Engines. Revised ed.

James Munro & Company Ltd., Glasgow.

C.C.Pounder; Marine Diesel Oil Engines, Newnes-Butterworth, London.

J.Cowley ; The running and Maintenance of Marine Machinery, the Institute of Marine Engineers, London.

D.A.Taylor: Introduction to Marine Engineering, Butterworth-Heinemann, Oxford. 1996.

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

(vol. 8), Thomas Reed Publication, London.

D. K. Sanyal - Marine Diesel Engines

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1602	**MARINE AUXILIARIES PAPER - 4** **UG22T2602**	**54 hrs.**

Theory – 54 marks

REFRIGERATION & OTHERS [54 hrs]

Unit 7 : Fuel

Source of supply, Study of Primary Fuels, Coal, Petroleum, Natural Gas Classification of Fuels. ,treatment in Residual fuels, blending of fuel, Emulsified Fuels, Merits and demerits of such fuel in marine engines.

Unit 8 : Lubrication

Theories of Lubrication, Types of Lubricants and their Properties their specific use. Terminology used in Lubrication systems, Loading pattern of Various bearings in marine use and Lubrication system adopted, Suitability of Lubricants for Various uses; solid and fluid lubricants. Additive Oils. L.O.analysis & monitoring Engine through report..

Unit 9 : Refrigeration Theory

Basic theoretical principles. Desirable properties of refrigerent and lubricating oil. Actual refrigerants and their properties; direct expansion plant and brine cooling systems; critical temperature; insulation.

Unit 10 : System components and operation

Domestic direct expansion refrigeration plants ; description of components. Flow control valves and ancillary fitting. Refrigerant charging , purging : Tests for leak; tests for commissioning after repairs; Maintenance of evaporators for efficient operation; trouble shooting.

Unit 11 : Cargo refrigeration

Types of refrigerated cargo, Air refreshing for fruit or other cargoes, temperatures required for different cargoes; insulation of hold , preparing plant for cargo loading .

Unit 12 : Accommodation air conditioning

Comfort conditions , accommodation ventilation , Need for air conditioning on ships; special design features; Statutory rules for ventilation; Exhaust air; Return air; Ventilation systems. Air-conditioning systems :Central system; Temperature control; Types and selection of central systems; Passenger ship considerations, duct system; air cleaning; sound attenuation; testing & balancing the system; operation & maintenance.

PRACTICAL

Code No. : P1602 Practical : 36 hrs.

1. To determine the hardness content of the sample of boiler water in mg/ltr (ppm) in terms of $CaCo_3$
2. To determine the chloride content of the sample of boiler water in mg/ltr (ppm) in terms of $CaCo_3$
3. To determine alkalinity due to phenolpthalein caustic alkalinity and total alkalinity of the boiler water sample in mg/ltr (ppm)
4. To determine phosphate content of the sample of water.
5. To determine dissolved oxygen content of the boiler water sample
6. To determine pH Value of the boiler water sample.
7. To determine viscosity, pour point, water content, flashpoint of given sample of lubricating oil / fuel oil.
8. To identify the components, operate and record the parameters using the Refrigeration simulator.
9. To identify the components, operate and record the parameters using the Air-conditioning tutor.
10. To prepare boiler for operation and operate boiler .

11. To carry out hydraulic pressure test of any shell .
12. To study refrigeration plant on computer software .

13. Film shows on marine repair work .

NOTE :

1) All the practical activities are to be carried out using appropriate tools.
2) Evaluation is on a continuous basis during the practical, on the ability to carryout the above tasks competently with demonstration of safe techniques.
3) Laboratory journal to be submitted at the end of each term for assessment .
4) At least 11 tasks are to be performed by each student .

RECOMMENDED BOOKS :

1) The running and Maintenance of Marine Machinery	J. Cowley
2) Marine Auxiliary Machinery	H. D. McGeorge
3) Introduction to Marine Engineering	Taylor D. A
4) Reed's General Engineering for engineers, Vol - 8	Thomas Reeds publications Ltd .
5) Marine Engineering Practice	IME

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1603	**MARINE INSTRUMENTATION & CONTROL ENGINEERING UG22T2603**	**72 hrs.**

Theory – 50 marks

Unit 1: Automatic Control Theory

Process Control, Feed Back/feed forward, Closed Loop and Open Loop Control, Two Step (On - Off) Control, Modulating Control, Desired Value, Set Value, measured value, Proportional control, proportional band, Off Set or Droop, Integral (reset) control, Derivative (rate) Control, Split Range control, Ratio and Cascade Control, block diagram for control system, step and ramp inputs, transfer Functions and writing equilibrium equations. System Response: Distance Velocity, Measurement and Transfer Lags.

Unit 2 : Automatic Controllers

Functions of a Proportional, Integral and Derivative Action Controllers, Pneumatic two step controller, pneumatic proportional controller, pneumatic PI controller, pneumatic PID controller. Stacked Type, Electronic and Pulse type Controllers, Controller Adjustments, Relays On-Off Cut , Ward-Leonard system with high accuracy of control.

Unit 3 : Signal Transmitting Devices Correcting Units

Flapper Nozzle, Electro Pneumatic signal converter, Electrical signal transmission. Pneumatic, Types of Controllers : hydraulic, electric and electronic controllers for generation of control action, Variable Inductance and capacitance transducer, Force Balance Transducer, Synchro, Servo mechanism, position control, derivative feed back, electronic derivative control, electronic PID control, speed control, accuracy of control. Diaphragm actuators, Valve-positioners, piston actuators, Electro-hydraulic actuators and Electric actuator control valves.

Unit 4 : Measuring instruments & Transducers

Measurement of Pressure, Temperature, Level and Flow measuring devices. Miscellaneous Instruments; -Shaft Power meters, Unbonded Strain Gauges, Bonded Strain Gauges, -Tachometers (Electric and Mechanical) -Water Purity Meters: Salinity Indicator, P H Meters -Oil

in Water Monitor: Photo Electric Cells, Photo Conductive Cells, Photo Voltaic Cells. -Viscosity Sensors. -Oil Mist Detector. Flow sensors & Square root extractors, Raster screens and their application to ship's Radar, RPM indicator and revolution counter, Level & depth measurement and Doppler log , gas analysers and other instruments for general use on board ship .

Unit 5 : Alternator control

Automatic start - stop logic for auxiliary engines, requirements for electric power supply, alarms and shut down. Alarm system, four departments of alarm system, alarm system with data logger, detailed block diagram. Control action in governors, electronic governors, load & speed sensing governors .

Unit 6 : Boiler control

Boiler water level control, swell and shrink actions, two and three element water level control, automatic combustion control, automatic relay system for burners, diesel engine cooling water temperature control using cascade control, fuel valve cooling water and lub. oil temperature control, fuel oil temp control, L.O pressure controller .

Unit 7: UMS operation of ships

Essential requirements for UMS operation, bridge control, critical speed. Control of main engine from bridge, ahead and astern flow charts, interlocks and alarm system, controllable pitch propellers, fire detection, bilge level alarms, automatic control and alarms for steam turbines and Gas turbine for UMS, auto operation of main and auxiliary boilers in UMS, electrical generating plants in UMS, Miscellaneous alarms in UMS operation Condition monitoring in UMS , Integration of bridge control, engine room control and cargo control room administration.

Unit 8 : System Analysis

Examination of system behaviour as a result of different inputs with respect to time or frequency response. Mathematical Models : System behaviour considered in a mathematical Sense using differential Equations . System description using mathematical terms for Mechanical, electrical engineering , Laplace Transforms Concept of stability, Routh & Hurtwtz stability criteria. Analysis of System performance under dynamic or transient Operating condition using Laplace Transforms. Performance characteristics. Nyquist stability criterion.

PRACTICAL

Code No. : P1603 Practical : 36 hrs.

1 Study of DC position control

1 Study of Process control engineering systems.
2 Study of Pneumatic valve circuits using a trainer.
3 Pneumatic control circuit trainer.
4 P.C. based temperature, level, pressure control.
5 Control valve characteristics.
6 Pneumatic PI control system for pressure control.
7 PC based programmable logic control.
8 Study Oil Mist Detector
9 Study of viscosity controller
10 Study of automatic boiler combustion control.
11 Study of various valve positioners .

NOTE :

1) There will be continuous assessment of skills being acquired through class-work, practicals and periodic assignments / project works / tests / orals etc.
2) All experiments are to be conducted by each student .
3) Laboratory Journal to be submitted for assessment at the end of each term .
4) At least 11 experiments to be completed by each student/cadet

RECOMMENDED BOOKS :

1.	Marine Control Practice	D. A. Taylor
2.	Instrumentation and control Engineering	Reed's Series
3.	Modern Control Engineering	Katusiko Ogata

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1604	**NAVAL ARCHITECTURE (STABILITY), SAFETY AND ENVIRONMENT PROTECTION PAPER – 4** **UG22T2604**	**54 hrs.**

Theory – 50 marks

SECTION – A (NAVAL ARCHITECTURE) [30 hrs.]

Unit 1 : Strength of Ships

Curves of buoyancy and weight, Curves of load, Shearing force and bending moments, Approximation for max. shearing force and bending moment, method of estimating B.M. & Deflection. Longitudinal Strength, Moment of Inertia of Section, Section Modulus. Stresses in deck and keel . Motion of Ship on waves, Types of waves, Trochoidal waves, Sinusoidal waves. Irregular wave pattern, Wave spectra, Wave amplitudes, practical aspects of rolling, Anti-rolling devices, Forces caused by rolling and pitching, Heaving and Yawing.

Unit 2 : Resistance & Powering

Frictional, Residuary & Total resistance, Froude's Law of comparison, Effective power calculations, Ships co-relation Factor (SCF), Admiralty co-efficient, QPC, Fuel Co-efficient and Fuel consumption. Effect of viscosity and application of I TTC formula.

Unit 3 : Propulsion & Propellers

Definitions, apparent and real ship wake, Thrust, relation between powers, relation between mean pressure and speed, relation between speed & fuel consumption , measurement of pitch, interaction between hull & propeller, co-efficients related to propeller, Cavitation. Propeller types, Fixed pitch, Variable Pitch, Ring propeller, Kort nozzles, Voith Schneider propeller, propeller theory .Blade element theory, Law of similitude and model tests with propellers, propulsion tests, Geometry and geometrical properties of screw propellers, ship model correlation ship trials.

Unit 4 : Rudders

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 rudders Bow rudders.

SECTIN – B (SAFETY AND ENVIRONMENTAL PROTECTION) [24 hrs]

Unit 5 : ISO / ISM / ISPS

Quality fundamentals, quality concepts, ISO series, requirements of QMS ISO-9000. Clauses of ISO: 9001 : 2008

Role of Government of India in control of merchant ships, ISM code, objectives and functional requirements for safety management system , , issue of DOC/SMC and maintenance of SMC, designated person , safety officer , internal audits, treatment of non conformities , Definition of flag state/ port state. Port state control inspection, Implication of ship's detention , involvement of ISM, ISPS code and applications.

Unit 6 : STCW

STCW- 1978 and modifications under STCW-2010, requirements to be fulfilled by government, Training in India , Government and private institutions.

PRACTICAL

Code No. : P1604 Practical : 36 hrs.

1) Practical training on solving stability problems of existing vessels in respect of: [10 Hrs]

   i) Centre of gravity ,

   ii) GM,

   iii) Free surface effect , angle of loll,

   iv) Hogging ,Sagging loads, Stresses in deck ,

   v) Safety of bulk carrier and Tankers etc .

2) Practical work in ship maintenance : [10 Hrs]

   i) welding and inspection of welds ,

   ii) surface preparation & painting ,

   iii) SOPEP ,

   iv) Maintenance of chains, windlass and propeller .

   v) ISM workshop

NOTE :

1) There will be continuous assessment of skills being acquired through class-work, practicals and periodic assignments / project works / tests / orals etc.
2) At least 8 experiments must be undertaken by every student .
3) Laboratory journal to be submitted at the end of each term for assessment .

REFERENCE BOOKS :

1) Derrett :Merchant ship stability for Masters & mates

2) Taylor :Ship Construction

4) Eyeres :Ship Construction

5) Kemp & Young :Ship Construction

6) Reeds :Ship Construction for Marine students

7) Naval Architecture :Munro & Smith .

8) Naval Architecture :Muckle

9) La Dage & Gemert :Stability

10) SOLAS (Latest Edition) :IMO Publications

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1605	**CARGO HANDLING & STOWAGE** **PAPER - 2** **UG22T2605**	**54 hrs.**

UNIT 1 : IMO CODES

Study of IMO codes and guidelines for the carriage of dangerous goods, timber, chemicals in bulks, liquefied gases in bulk, grain, and bulk cargoes.

UNIT 2 : STOWAGE & CARRIAGE OF VARIOUS CARGO

Detailed study of stowage and securing of various types of cargoes taking into account safety of ships and cargoes.

UNIT 3 : CARGO HANDLING

Cargo handling gear. designs and strength parameter, special requirements for handling of bulk cargoes and containers.

Study of Bulk carriers with respect to: Loading, discharging, ballasting. Deballasting Operation.

Precautions to be taken for high density cargoes, grain and concentrates.

UNIT 4 : LIQUID CARGOES

Principles involving the carriage of oil, chemicals and gases in bulk. Procedure to follow at tanker terminals, Detail study of tanker terminal codes for handling of petroleum product, bulk liquid chemicals and liquefied gases. Avoidance .of accidental pollution's and precautions to be taken.

UNIT 5 : OIL TANKERS

Study International safety guide for oil tankers and terminals. Study of Tankers with respect to: Types of pumps, valves, pipeline systems, Ullageing, interface, cargo calculation. Operations of loading, discharging, ballasting, de-ballasting, inerting tank washing including COW, gas freeing. Flammability diagram. Instructions for use. of Oxygen and Hydrocarbon analyzer. Man entry procedures. Rescue teams. Control of Oil spill.

UNIT 6 : CARGO CALCULATION

Calculation relating to above topics to ensure safety of the ship and environment .

NOTE : Units 1, 2, 3, 4 & 5 will be covered in the first term and Units 6, 7, 8, 9, 10 & 11 will be covered in the second term .

BOOKS FOR REFERENCE:

1. cargo work : Kemp and Young
2. Seamanship and Cargo Work : Capt: J. Dinger
3. Cargo work : Capt. L.G. Taylor
4. Stowage of Cargo : O.O. Thomas
5. Grain Rules I.M 0.

6. Code of Safe Practice for Bulk Cargo : I.M.O.

7 . International Bulk Chemicals code 1986. : I.M.O.

8. I.M.D.G. Code Consolidated edition 1988 : I.M.O.

9. Marpol73/78 Consolidated Edition : I.M 0.

10. Load Line convention I966 : I.M.O.

11. Guidelines for Tank washing with Crude Oil . : Institute of Chamber of Shipping

12. The Chemistry of Oil Tankers Fires and the Inert Gas System : Capt. G.S. Heredia

13. Tanker Handbook for Officers : Capt. C. Baptist

14. Tanker Practice : G.A.B. King

15. Tanker Practice : Rutherford

16. International Safety Guide for Oil Tankers & Terminals (ISGOIT) : International Chamber of Shipping, OCIMF, IAPH

17. Amendments to SOLAS Convention Manual for Maritime Mobile Communication and Maritime Mobile Satellite Communication : I.T.U.

18. International Volume of Radio Signals : HMSO

19. International Code of Signals : I.M 0

20. GMDSS for GOC : Clifford Merchant

21. Cargo Work : Dhananjay Swadi

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1606	**SHIP OPERATION & MANAGEMENT** **UG22T2606**	**72 hrs.**

Theory – 75 marks

SECTION – A (Management Science) [20 hrs]

Unit 1 : Introduction to Management

Principles & Practice, Definition and objectives of sound management. Need for Sound Management Principles and Practice & Growth of Modern management thought, management functions, Process Planning, Corporation / Long term & tactical strategy, Policy distribution, SWOT Analyses, Organising - definition / illustrations ; Staffing - manpower, planning, Directing - illustration, Controlling, parameters, application Co-ordination: communication-efficient process model, communication barriers, inter-personnel communication skill. Principles of Locating a Plant & Developing Organisation Structure. Various types of organizational structures - Line / staff / matrix, centralization vs. decentralization of delegation /empowerment decision making. distinction between authority / responsibility / accountability, Basic principles of employees; Authority & Responsibility, Boundaries of authority .

Unit 2 : Operations Management

Distinction between products & services, Types of production system viz. Jobbing 1 Lot / Mass. Functions of Production Planning and Control Product Development Principals, Standardization, Simplification & Specialization, Plant Layout, Product / Process, Logistics & supply chain / management. Integrated material management - Functions of material planning, inventory control, safety stock / cycle stock, purchases / stores performance, measurement parameters, standardization / codification, waste control. Introduction to Operations Research. Linear Programming, Distribution Methods, Network Technique in Management – Critical Path

Method (CPM), Programme Evaluation & Review Technique (PERT). Resources Allocation & Loading smoothing, Operational Sales Forecasting; Introduction to Decision Theories in Management, Decision under Certainty, Right and uncertainty, Works Study, Job Evaluation & Merit Rating, Quality Management System, Quality Control, Total Quality Management , ISO 9000 series, Preventive / condition based Maintenance & spare management.

Unit 3 : Finance Management

Methods of Capital formation & Control of Working Capital, How to read balance sheet / Profit / Loss, Budgetary Control & standard costing - Favourable / Adverse variances. Continuous & Discounted Cash Flow & Project Appraisal, Break even Analysis, Cost Benefit Analysis, Methods of Depreciation Factory Costing, Estimating, Balance Sheet, Financial & Physical Rations; Project & Budgetary Control.

Unit 4 : Human Resource Management

Human Resource Development, Human resource Planning, The personnel Function, Requirement & Selection, Role of Psychological Tests in Recruitments, Training of employees, Performance Appraisal & counseling, Reward System, Legal Requirements and Regulation of Working Condition, Employer's Liabilities for Health and Safety, Leadership / Group Dynamics and Discipline, Motivation theories and Incentives, Maslow's hierarchy of needs theory , McGregor,s X and theory Y, Hygienic and motivational factors, Elton Mayo's contribution. Problems of Accident – Profaners, fatigue, etc., Relation with Trade, Union & Workers Participation in Management.

SECTION – B (Ship Management) [52 hrs]

Unit 5 : Introduction

Brief history of Shipping : Modern shipping Practice. Marine vehicles and cargo care of cargo against damage. Development in Shipping and cargo handling Multimodal transportation, Factors affecting universal adoption. Liner and tramp shipping services.

Unit 6 : Conference systems

Organisation & concerns Shippers Council. Chartering, Charter parties. Theory of freight rates and fares. Rate fixation machinery and government control. Responsibilities of ship owners & charters. Tanker chartering. Freight rates &fares -various terms, influencing factors, market pricing.

Unit 7 : Carriage of goods

Bill of Lading - Function & Uniqueness & related problems , Carriage of goods by sea act. Cargo Surveys and protests, Marine Insurance; Underwriting and loss adjusting principles applied to Marine cargo insurance. Hull I machinery policy, particular average. General average, P & I Clubs - making claims. Marine Fraud : Genesis and prevention.

Unit 8 : Shipping Companies

Organisational structure, Restructuring on the basis of functional coherence, ship management companies. Turn around Strategy for sick shipping companies, Ownerships of vessels, Shipping Company and its administration. Flags of convenience, flags of discrimination and their effects on shipping. .

Unit 9 : Capitalization and finance

Characteristics, cost ratios &allied definition. Sources, Financing page, Lender security, Relation between Insurance premium, & non-conformity / condition of class. Economics of new and second hand tonnage. Subsidies, procedure & implication of buying & selling new / old vessels.

Unit 10 : Ship Operations

Planning sailing schedules. influencing factors, Unbalance in sea trade, counter-action, Voyage estimation, Manning of ships, engagement & discharge of crew. Economic factors. Commercial Shipping practice. Manning of ships. Engagement and discharge of

crew, D.L.B. Seaman's Welfare. .

Unit 11 : Merchant Shipping act

Registration of ship, Ship's Papers. Port Procedures, Pilotage,

Duties regarding pollution. Collision, Explosion, fire etc. Vessels in distress. Shipping

causalities penalties under Merchant Shipping Act. Indian Shipping : Current scenario and few Case studies.

Unit 12 : Monitor compliance with legislative requirements

(i) To demonstrate basic working knowledge of the relevant IMO convention concerning SOLAS, MARPOL, Load Line, ISM Code, ISPS Code and STCW-2010 with regards to contents objectives, application, amendments.
(ii) Code of Safe working practices for Merchant Seamen.
(iii) Indian merchant shipping Act and Rules : Statutory surveys and certificates and preparations for t he same.
(iv) Classification Society surveys and certificates - Preparations for the Same.

Unit 13 : Application of Leadership and Team working skills

(i) working knowledge of shipboard personnel management and training.
(ii) A knowledge of related international Maritime conventions and recommendations, and national legislation.
(iii) Ability to apply task and workload management including : (a) Planning and coordination (b) Personnel assignment (c) Time and resource constraints (d) prioritization.
(iv) Knowledge and ability to apply effective resource management : (a) allocation, assignment, and prioritization of resources (b) effective communication onboard and ashore (c) decisions reflect consideration of team experiences (d) assertiveness and leadership including motivation (e) obtaining and maintaining situational awareness.
(v) Knowledge and ability to apply decision-making techniques : (a) situation and risk assessment (b) identify and consider generated options (c) selecting course of action (d) evaluation of outcome effectiveness.

Unit 14 : Contribute to the safety of personnel & ship

(i) Knowledge of personal survival techniques.
(ii) Knowledge of fire prevention and ability to fight and extingnishing fires.
(iii) Knowledge of elementary first aid.
(iv) Knowledge of personal safety and social responsibilities.

RECOMMENDED BOOKS :

1	Essentials of Management	Joseph L. Massie
2.	Industrial Organisation & Management	A. S. Deshpande
3.	Management Theory & Practice	Earnest Dale
4.	logistic Management in Maritime trade	Dr K. V. Hariharan

5.	Elements of Shipping	Alan Branch
6.	International Maritime Fraude	Ellen & campbell

INDIAN MARITIME UNIVERSITY

THIRD YEAR

SEMESTER – VI

UG/MS/MS/T/1607	**COMPETENCY ENHANCEMENT MODULES INCLUDING GMDSS GOC, ENGINE ROOM SIMULATOR MODULAR COURSE** **UG22T2607**	**20 hrs.**

1) DGS Approved Engine Room Simulator Course (for 3 days)
2) Familiarisation training on GMDSS.
3) Familiarisation training on ROC.
4) Familiarisation training on ARPA.
5) Training on Ship Handling Simulator
6) Practical training on cargo work :

i) To overhaul the metallic block and reassemble the sheaves, pin, grease nipple etc.

ii) To reeve the tackles - Two block to two block, two block to three block, three block to three block etc.

iii) To understand & practice following "KNOTS & HITCHES" as Over Hand Knot, Figure of Eight Knot, Timber Hitch, Sheet Bend , Clove Hitch, Reef Knot, Bow Line, Rolling Hitch, Half Hitch, Marline Spike Hitch, Carrick Band, Cow Hitch, Black Wall Hitch, Marling Hitch, Awning Hitch, Chair Hitch.

iv) To practice the use of Bottle - Screws or TURN BUCKLES, BULL - DOG GRIPS etc. and various lashing material.

v) To practice the repairs in "PILOT LADDER" and know the various parts.

vi) To open and reassemble "Joining Shackle" of an Anchor.

vii) Study various types of hooks, shackles and understand the certificate markings thereon.

viii) To practice splicing of MANILA & WIRE ROPES with Different Splices

ix) Short Splice , Eye Splice ,Left Handed Splice ,Back Splice

x) Making of Monkey Fist for Heaving – Line

xi) To splice "Mooring Rope" i.e. 8 - standard Polypropylene rope.

xii) To practice on working / simulated model of crane Luffing, hoisting and slewing operations.

xiii) To practice on working / simulated model of opening/ closing of hatches.

NOTE :

1) There will be continuous assessment of skills being acquired through periodic assignments / project works / tests / orals etc.
2) Module No1 is compulsory . At least FOUR modules to be completed from the rest
3) Laboratory journal to be submitted at the end of each term for assessment

RECOMMENDED BOOKS : Training Manuals for relevant modules.

INDIAN MARITIME UNIVERSITY

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SEMESTER – VI

UG/MS/MS/T/1608	**EXTERNAL MARINE WORKSHOP TRAINING** **UG22T2608**	**160 hrs.**

Training will be imparted as per approved TAR Book and programme of MDL approved by DGS