



INDIAN MARITIME UNIVERSITY

(A Central University under Ministry of Shipping, Govt. of India)

School of Nautical Studies

offers
SYLLABUS
for

Diploma in Nautical Science (DNS)

leading to

Bachelor of Science (BSc)
(Applied Nautical Science)

REGULATIONS AND SYLLABUS
(5th revision)

2021

(With effect from August 2021 batch)

Summary of Total Hours for Semester I & Semester II

Semester I				Semester II			
Sr No	Subject Code	Subject Name	Hrs	Sr No	Subject Code	Subject Name	Hrs
1	UD11T5101	Applied Mathematics	41	1	UD11T5201	Navigation III: Navigation & Chartwork	87
2	UD11T5102	Applied Sciences	60	2	UD11T5202	Navigation IV: Advanced Bridge Equip, W/keeping and Meteorology	67
3	UD11T5103	Ship Construction & Ship Stability I	44	3	UD11T5203	Cargo Handling, Stowage & Seamanship II	70
4	UD11T5104	Navigation I: Navigation & Chartwork	65	4	UD11T5204	Ship Construction & Ship Stability - II	74
5	UD11T5105	Navigation II: Bridge Equipment, Watchkeeping & Meteorology	60	5	UD11T5205	MARPOL & Marine Engineering Knowledge	52
6	UD11T5106	Cargo Handling, Stowage and Seamanship I	68	6	UD11T5206	Emergencies, Maritime Communication and Commercial Shipping	46
7	UD11T5107	English & Human Factors	52				
Theory Total Hours			390	Theory Total Hours			396
1	UD11P5101	Applied Sciences Lab	20	1	UD11P5201	Communicative English Lab	18
2	UD11P5102	Computer Lab	20	2	UD11P5202	Workshop Practices & SeamanShip	67
3	UD11P5103	Workshop Practices	37	3	UD11P5203	Navigation Laboratory	30
4	UD11P5104	Seamanship Lab	44				
Practicals Total Hours			121	Practicals Total Hours			115
Grand Total Hrs (Theory + Practical) 7 Theory + 4 practical			511	Grand Total Hrs (Theory + Practical) 7 Theory + 4 practical			511

Course Curriculum for One year Diploma in Nautical Science (DNS) leading to B.Sc. (Applied Nautical Science) Degree

Credit System

The University follows the “Credit System” for its programmes. Each credit in the DNS Nautical Science program is equivalent to 15 hours of study comprising all learning activities which include reading and comprehension, listening to audio, watching videos, attending counseling sessions, teleconferencing, and writing assignment responses. Thus, a four credit course involves 60 study hours. This helps the student to understand the academic efforts one has to put in, in order to successfully complete a course. Completion of an academic programme requires successful clearing of both the assignments and the term end examination of each course in the programme. The course outline and timetable provide guidance on the time allocation for the course material, but the faculty teaching the subject is free to make adjustments as necessary.

First six months

Subject Code	Subject Name	Teacher Assessment Marks (Attendance, Discipline, Journals, Assignment, Lab works)	Class Test Marks (objective & or written & or oral & or quiz)	Internal Marks	University Examination	Pass Marks (University Examination)	Total Marks (Final)	Total Marks (Passing %)	Lecture Per Week	Practical Per Week	Total Study Hours per week/per Six months	Credits
UD11T5101	Applied Mathematics	10	20	30	70	35 / 70	100	50	3	NA	3/41	3
UD11T5102	Applied Sciences	10	20	30	70	35 / 70	100	50	4	NA	4/60	4
UD11T5103	Ship Construction & Ship Stability I	10	20	30	70	35 / 70	100	50	3	NA	3/44	3
UD11T5104	Navigation I: Navigation & Chartwork	10	20	30	70	35 / 70	100	50	5	NA	5/65	4
UD11T5105	Navigation II: Bridge Equipment, Watchkeeping & Meteorology	10	20	30	70	35 / 70	100	50	5	NA	5/60	4
UD11T5106	Cargo Handling, Stowage and Seamanship I	10	20	30	70	35 / 70	100	50	5	NA	5/68	5
UD11T5107	English & Human Factors	10	20	30	70	35 / 70	100	50	3	NA	3/52	4
UD11P5101	Applied Sciences Lab	10	40	50	50	25 / 50	100	50		2	2/20	1
UD11P5102	Computer Lab	10	40	50	50	25 / 50	100	50		2	2/20	1
UD11P5103	Workshop Practices	10	40	50	50	25 / 50	100	50		3	3/37	2
UD11P5104	Seamanship Lab	10	40	50	50	25 / 50	100	50		3	3/44	3
	Totals	110	300	410	690	0	1100				38/511	34

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Second six months

Subject Code	Subject Name	Teacher Assessment Marks (Attendance, Discipline, Journals, Assignment, Lab works)	Class Test Marks (objective & or written & or oral & or quiz)	Internal Marks	University Examination	Pass Marks (University Examination)	Total Marks (Final)	Total Marks (Passing %)	Lecture Per Week	Practical Per Week	Total Study Hours per week/per Six months	Credits
UD11T5201	Navigation III: Navigation & Chartwork	10	20	30	70	35 / 70	100	50	7	NA	7/87	6
UD11T5202	Navigation IV: Advanced Bridge Equip, W/keeping and Meteorology	10	20	30	70	35 / 70	100	50	5	NA	5/67	5
UD11T5203	Cargo Handling, Stowage & Seamanship II	10	20	30	70	35 / 70	100	50	5	NA	5/70	5
UD11T5204	Ship Construction & Ship Stability - II	10	20	30	70	35 / 70	100	50	5	NA	5/74	5
UD11T5205	MARPOL & Marine Engineering Knowledge	10	20	30	70	35 / 70	100	50	4	NA	4/52	3
UD11T5206	Emergencies, Maritime Communication & Commercial Shipping Knowledge	10	20	30	70	35 / 70	100	50	4	NA	4/46	3
UD11P5201	Communicative English Lab	10	40	50	50	25 / 50	100	50	NA	1	1/18	1
UD11P5202	Workshop Practices & S'Ship	10	40	50	50	25 / 50	100	50	NA	5	5/67	4
UD11P5203	Navigation Laboratory	10	40	50	50	25 / 50	100	50	NA	2	2/30	2
	Totals	90	240	330	570		900				38/511	34

DNS SEM I – 1100 marks + SEM II – 900 marks = 2000 marks

BOOKS PRESCRIBED BY "INDIAN MARITIME UNIVERSITY" FOR ISSUANCE TO STUDENTS

The 'Maritime Training Institute' is required to issue any one book on each subject mentioned below to each of the cadets within 15 days of joining the institute.

SR. NO.	SUBJECT	AUTHOR	AUTHOR	AUTHOR	AUTHOR	AUTHOR	AUTHOR
1	Spherical Trigonometry	Capt. H. Subramaniam	J.H. Clough - Smith				
2	Principles of Navigation	Capt. T.K. Joseph and Capt. S.S.S. Rewari	Capt. S.K. Panda	Capt. P.M. Sarma			
3	Practical Navigation and Nautical Almanac	Capt. H. Subramaniam	Capt. S.S. Chaudhary				
4	Chart Work	Capt. S.K. Puri	Capt. S.S. Chaudhary	Capt. S.K. Panda	Capt. C.L. Dubey	Capt. M.V. Naik and Capt. Warty	
5	Nautical Tables	Nories	Burtens				
6	Bridge Watchkeeping, Marine Sextant and	Capt. H. Subramaniam	ICS Bridge Procedures Guide				
7	Bridge Equipment	Capt. A.G. Bhatia	G.J. Sonnenberg				
8	Collision Regulations	Bhandarkar and ROR Cards	Capt. Errol Fernandes	Capt. S.K. Puri	Capt. Y. Chhabra		
9	Meteorology & Weather Code	Capt. H. Subramaniam	Reeds				
10	Cargo Work	Capt. Errol Fernandes	Kemp and Young	Capt. S.K. Panda	Taylor	D.J. House	Dhananjay Swadi
11	Tanker Work	Capt. K.S.D. Mistree	G.A.B King	Dhananjay Swadi	ICS Booklets on Oil, Gas & Chemical		
12	Ship Construction	Kemp and Young	Reeds Vol. V	Pursey			
13	Ship Stability	Capt. H. Subramaniam (Vol. I)	D.R. Derret	Kemp and Young			
14	M.V. Hindship Stability Particulars	Capt. T.K. Joseph and Capt. S.S.S. Rewari					
15	Seamanship	Bhandarkar (Dinger)	Capt. D.J. House	Bosuns Manual Miller	Dantons		
16	Basic Marine Engineering Knowledge	J.K. Dhar	Reeds				
17	Ship Operations, Safety & Environmental Protection	Capt. Errol Fernandes	H.I. Lavery				
18	Mathematics	One Book of Institute Choice					
19	Physics	One Book of Institute Choice					
20	Electronics	One Book of Institute Choice					

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UD11T5204	Ship Construction & Ship Stability - II	95
UD11T5205	MARPOL & Marine Engineering Knowledge	101
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SEMESTER I

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UD11T5103	Ship Construction & Ship Stability I	10	20	30	70	35 / 70	100	50	3	NA	3/44	3
UD11T5104	Navigation I: Navigation & Chartwork	10	20	30	70	35 / 70	100	50	5	NA	5/65	4
UD11T5105	Navigation II: Bridge Equipment, Watchkeeping & Meteorology	10	20	30	70	35 / 70	100	50	5	NA	5/60	4
UD11T5106	Cargo Handling, Stowage and Seamanship I	10	20	30	70	35 / 70	100	50	5	NA	5/68	5
UD11T5107	English & Human Factors	10	20	30	70	35 / 70	100	50	3	NA	3/52	4
UD11P5101	Applied Sciences Lab	10	40	50	50	25 / 50	100	50		2	2/20	1
UD11P5102	Computer Lab	10	40	50	50	25 / 50	100	50		2	2/20	1
UD11P5103	Workshop Practices	10	40	50	50	25 / 50	100	50		3	3/37	2
UD11P5104	Seamanship Lab	10	40	50	50	25 / 50	100	50		3	3/44	3
	Totals	110	300	410	690	0	1100				38/511	34

Detailed Teaching Syllabus

Subject code	UD11T5101	Block 1	Vector Algebra, Operational Research And Graphs
Subject name		Applied Mathematics	
		Block 2	Solid Geometry
		Block 3	Proportion, Variation And Interpolation

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES		
Vector Algebra, Operational Research And Graphs	Vector Algebra	1.1	Explain The Difference Between Scalar And Vector Quantities.	U	2	L	2	N	FORCES, RADAR PLOTTING AND WIND TRIANGLE	R1, R6, R14
		1.2	Explain And Solve Addition And Subtraction Of Vectors, And Multiplication Of Vectors By Scalars.	U/A						
		1.3	Explain Position Vectors, Resolution Of Vectors And Applications.	U/A						
		1.4	Solve Problems Involving Forces, Velocities And Accelerations.	A						
	Graphs	2.1	Explain "Origin", "Abbscissa", "Ordinate", And Describes How A Point Is Determined By Its Cartesian Co-Ordinates.	U	2	L	2	N	STABILITY CURVES	R16
		2.2	Explain How To Plot Points Given Their Cartesian Co- Ordinates, How To Draw A Smooth Curve Through Plotted Points, And Related Calculations.	U/A						
		2.3	Explain How To Extract Values From Graphs Of Ship's Data And Related Applications.	U/A						
		2.4	Explain The Procedure And Draw Graph Of Given Functions	U/A						
		2.5	Explain How To Solve Simultaneous Equations Graphically And Related Calculations.	U/A						
Solid Geometry	Co-Ordinate Geometry	4.1	Explain Standard And General Equations Of Circles, Tangent To A Circle And Applications.	U/A	3	L	3	N	HYPERBOLIC AIDS TO NAVIGATION	R2, R3, R4, R8
		4.2	Explain Standard Forms Of Equations Of Parabola, Ellipse, Hyperbola And Applications With Regards To Navigation.	U/A						
		4.3	Describe The Major And Minor Axes Of An Ellipse And Draw The Ellipse.	U/A						
	Mensuration And Geometry	5.1	Explain Angles (Acute,Obtuse And Reflex) And Triangles (Isosceles, Scalene, Equilateral And Right Angled)	U	3	L	3	N	FOR AREAS, VOLUMES AND CENTROIDS OF SHIP SHAPES	R10, R11
		5.2	Describe The Properties Of Similar And Congruent Triangles.	U						
		5.3	Explain And Apply Pythagorus Theorem	U/A						
		5.4	Explain Arc, Chord, Segment And A Sector Of A Circle	U						
		5.5	Define And Determine Median, Centroid, In- Centre And Circumcentre Of A Triangle.	K/A						
		5.6	Describe Quadilateral, Parallelogram, Trapezium And Rhombus.	U						
		5.7	Find Surface Areas And Volume Of Simple Shapes (Cubes, Sphere, Cone And Cylinder) Hollow & Solid	A						
		5.8	Calculate Perimeter And Areas Of A Square, Rectangle, Parallelogram, Trapezium, Rhombus, Triangle And A Circle.	A						
		5.9	Calculate Areas Of Sectors And Segments Of A Circle.	A						
		5.10	Explain And Apply Simpson's Rules - First, Second And Five- Eighth Rule For Their Use In The Computation Of Areas, Volumes And Centroids. (No Derivations)	U/A						
	Trigonometry	6.1	Explain The Concept Of Radian And Degrees.	U	2		3		AZIMUTH CALCULATIONS	R7

Detailed Teaching Syllabus

Subject code	UD11T5101	Block 1 Vector Algebra, Operational Research And Graphs
Subject name	Applied Mathematics	Block 2 Solid Geometry
		Block 3 Proportion, Variation And Interpolation

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Solid Geometry	Trigonometry	6.2	Define Sine, Cosine, Tangent And Corresponding Reciprocal Ratios	K				
		6.3	Determine The Trigonometrical Functions For Angles Of Any Size And State The Values For Angles $0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° Use Calculator To Determine Value Of Trigonometric Functions For Various Angles	A			SIGHT CALCULATIONS	
		6.4	To Find Trigonometrical Ratios Of The Angle $(90^\circ \pm ?)$, Angle $(180^\circ \pm ?)$, In Terms Of Those Of ?	A				
		6.5	Draw Graphs Of Trigonometrical Functions	A				
		6.6	Use Of Trigonometric Formula $\sin^2 A + \cos^2 A = 1$, $\sin A / \cos A = \tan A$, $\sin 2a$, $\cos 2a$ To Solve Simple Identities.	A				
		6.7	Applications /Solving Problems Related To Trigonometrical Functions (Right Angled Triangle/ Oblique Plane Triangle)	A				
	Spherical Trigonometry	7.1	Define Properties Of Spherical Triangle.	K	5 L	5 N	SIGHT CALCULATIONS	R5, R9
		7.2	Define And Explain Great Circle, Small Circle, Pole, Spherical Angle.	K/U				
		7.3	Explain The Sine And Cosine Formulae.	U				
		7.4	Explain And Use The Haversine Formula And Its Advantage Over The Sine And Cosine Formulae. Solution Of Spherical Triangles By Haversine Formula And Sine And Cosine Formula.	U/A				
		7.5	Explain Right-Angled Spherical Triangles And Their Properties.	U				
		7.6	Explain Quadrantal Spherical Triangles And Their Properties.	U				
		7.7	Explain Napier's Rule For Right Angled Spherical Triangles And Quadrantal Spherical Triangles.	U				
		7.8	Explain Polar Triangles And Their Application In The Solution Of Spherical Triangles.	U/A				
Proportion, Variation And Interpolation	Proportion, Variation And Interpolation	8.1	Define The Ratio Of Two Quantities	K	2 L	4 N	MAP AND DRAWING SCALES	R4, R15, R16
		8.2	Solve Proportional Equation (Given Any Three Quantities, Calculate Fourth)	A			SIGHT CALCULATIONS	
		8.3	Explain What Is Meant By "Directly Proportional" And "Inversely Proportional"	U			ULLAGE TABLES	
		8.4	Solve Problems On Direct, Inverse And Joint Variation	A			DEADWEIGHT SCALES	
		8.5	Describe "Linear Interpolation" And Use It To Find Intermediate Values In Tables Such As Ullage Tables And Deadweight Scales	U/A			SQUAT CALCULATION	
		8.6	Explain How To Perform Extrapolation To Find The Value Of The Argument Given Intermediate Values And Related Calculations.	U/A				
		8.7	Explain/ Solve Problems Regarding Interpolation And Extrapolation.	U/A				
					19	22	Total 41 Hrs	

Methodology and Reference Books

Subject Code

UD11T5101

Subject Name **Applied Mathematics**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Vector Algebra - by Shanti Narayan	R9	An Introduction to Spherical Trigonometry - by Clough-Smith, J.H.
R2	Co-ordinate Geometry - by S.L. Loney	R10	Elements of Applied Mathematics Vol. I - by Wartikar, P.N. and Wartikar, J.N.
R3	Engineering Mathematics - by Bali, Saxena and Iyengar	R11	Text Book of Applied Mathematics Vol. I & Vol. II - by Wartika, P.N. and Wartikar, J.N.
R4	Higher Engineering Mathematics - by B.S. Grewal	R12	Mathematical Statistics - by Kapur, J.N. and Saxena. H.C.
R5	Spherical Trigonometry - by Capt. H. Subramaniam	R13	Statistics & Probability for Engineers - by Myers
R6	Engineering Mathematics - by G.S. Sharma and I.J.S. Sarna	R14	Text Book of Vector Analysis - by Shanti Narayan
R7	Plane Trigonometry - by S.L. Loney	R15	Foundation Mathematics for ICSE School - by R.S. Aggarwal
R8	Solid Geometry - by S.L. Loney	R16	IGCSE : Mathematics Revision Guide - by Martin Law

Detailed Teaching Syllabus

Subject code	UD11T5102	Block 1 Physics
Subject name		Block 2 Electricity
		Block 3 Electronics
Applied Sciences		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES		
Physics	Mechanics	1	Basic concepts:		8	L	4	N	R1, R2, R3, R4, R5, R14, R15	
		1.01	Explain the following: relative velocity, force, triangle and parallelogram law of forces and pressure, potential and kinetic energy, conservation of energy and efficiency, conservation of linear momentum, impulse, collision. Friction and its coefficient.	U				Rated Capacity Of Motors, Power		
		1.02	Explain and determine moment of inertia, angular velocity, angular acceleration, angular momentum, conservation of angular Momentum and radius of gyration, couple and torque, theorem of parallel and perpendicular axis, centripetal and centrifugal forces.	U,A				Flywheel, Steam Turbine, Recoil After Collision		
		1.03	Explain rotation – stability with rotation, the spinning top. Gyroscope, Gyroscopic inertia & gyroscopic precession.	U				Gyro Compass Gyroscope		
		1.04	Explain and determine centroids - centre of gravity, centroid of areas, centroids of volumes, centroids of masses, centroid of composite figures.	U,A				Ship Stability (Centers Of Buoyancy/ Floatation/ Gravity)		
	Heat	2.01	Introduction to heat, thermal expansion of liquids. Real and apparent expansion. Application to liquid cargoes. Anomalous expansion of water. Three primary gas laws : Charles' Law, Boyle's Law and Avogadro's Law	K,U	5	L	2	N	CARGO TEMPERATURE AND ITS EFFECT ON VOLUME / PRESSURE METEOROLOGY	R3, R16, R17
		2.02	Explain specific heat and latent heat. Explain change of state. Effect of pressure and salinity on the boiling and freezing point of water	U						
		2.03	Describe the thermodynamic scale . Explain the relationship between celsius, kelvin and fahrenheit scale.	U						
		2.04	Thermodynamics- introduction to mollier diagram and simple refrigeration circuit (overview).	U				REFRIGERATION SYSTEMS WINDLASS, STEAM TURBINES		
		2.05	Explain basic formation of “superheated steam”, its applications, Hazards and precautions.	U						
	Oscillations	3.01	Define and explain amplitude, frequency and period. Explain basic Concepts of S.H.M and its features, typical examples such as a pendulum. Horizontal and Vertical spring-mass system (no derivations but calculations)	K,U,A	3	L	2	N	ROLLING OF SHIPS, ANTI-HEELING TANKS	R3, R7, R18, R19, R20
		3.02	Explain damped and undamped oscillations, forced oscillations, and resonance. (no derivations but calculations)	U,A				critical revolutions of machinery and rolling CRITICAL RPM OF MAIN ENGINE		
	Sound	4	Sound		5	L	2	N	SURGE PRESSURE IN LIQUIDS, Ship's whistle ECHO SOUNDER, DOPPLER LOG	R8, R18
		4.01	Explain velocity of sound in air and compare with water & metal	U						

Detailed Teaching Syllabus

Subject code	UD11T5102	Block 1 Physics
Subject name	Applied Sciences	Block 2 Electricity
		Block 3 Electronics

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES		
Physics	Sound	4.02	Explain the effects of temperature, pressure and salinity on velocity of sound in Sea water	U						
		4.03	Explain the characteristics of sound: loudness, pitch and quality. Define decibel. State the approximate range of audible sound.	U	5	L	2	N	ULTRASONIC EQUIPMENT FOR CHECKING WEATHER TIGHTNESS.	
		4.04	Explain that sound follows the laws of reflection and refraction, and is diffracted in the same way as other waves. Describe the application of reflection to the measurement of depth by echo- sounder and to the ultrasonic detector for checking hatch weather tightness.	U					SOUND RECEPTION SYSTEMS ON ENCLOSED BRIDGES FOR RECEPTION OF EXTERNAL SOUNDS.	
		4.05	Explain doppler effect and applications.	U						
		5.01	Explain with diagram the propagation of light, state the laws of Reflection. Explain reflection of light at plane and curved surfaces. Calculations based on Mirror formula (DERIVATION of formula NOT REQUIRED)	U					R11, R12	
	5.02	Explain refraction, refractive index and total internal reflection (tir). Discuss the applications of tir with diagrams like mirages, looming and propagation of light in optical fibre.	U	MEANING OF MAGNIFICATION OF BINOCULAR						
	5.03	Calculations based on Lens formula (DERIVATION of formula NOT REQUIRED)	A	SEXTANT						
	5.04	Explain with diagrams refraction through prism and lenses. Discuss periscope, telescope and prism binocular with diagrams.	U	LUMINOUS RANGES OF LIGHTS						
	5.05	Sketch a sextant showing the arrangement of mirrors, the paths of rays to the observer's eye and how the angle between the two objects is measured.	A							
	5.06	Explain why wheelhouse windows are required to be inclined.	U							
	Electricity	Current And Static Electricity	6.01	Definitions of electric current, emf, pd, power and energy etc.					K	4
6.02			Define ohm's law its applications and limitations. Effect of temp. On resistance.	K	TANKERS AND ELECTRICAL STORMS					
6.03			Explain static electricity and state its hazards. Explain heating effect of electric current and its applications (geysers, electric bulbs etc)	U	GAS METERS					
6.04			Explain heating effect of electric current and its applications (geysers, electric bulbs etc)	U,A						
Current Electricity And Its Effects		7	Basic concepts		7	L	3	N		
		7.01	Explain magnetic effect of electric current (straight conductor, parallel conductors, coil and solenoid). Explain electromagnetic induction and state faraday's laws and lenz's law.	U						

Detailed Teaching Syllabus

Subject code Subject name		UD11T5102 Applied Sciences		Block 1	Block 2	Block 3			
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Electricity	Current Electricity And Its Effects	7.02	Ac supply (average and rms value of ac current), AC and DC generators. Discuss motors, transformers and understanding of the power units- kVA, kW, kVAR. (no derivations).	U					
		7.03	Explain self / mutual inductance, series and parallel combinations of inductors..(no derivations)	A					
		7.04	State the hazards associated with use of electrical energy (including high voltage) and the appropriate safe working practices. Describe the conditions which increase the effect of electric shock. Explain the term "intrinsically safe"	K,U					
Electronics	Transmitters	8	Basic concepts		6	L	0	N	
		8.01	Explain working of a radio transmitter and receiver with block diagram.	U					
		8.02	Explain the following terms- antennas: straight (whip), and yagi; electro magnetic waves, ionosphere, ground waves, and sky waves.	U					
		8.03	Explain the basic working of sensors and transducers for temperature, pressure, level, flow rate, etc.	U					
		8.04	Explain radar transmitters, receivers and antenna.	U					
					43	17	Total 60 Hrs		

Methodology and Reference Books

Subject Code

UD11T5102Subject Name **Applied Sciences**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Mechanics - by D.S. Mathur	R16	Heat Thermodynamics and Statistical Physics - by Brij Lal and Subrahmanyam, N.
R2	Fundamentals of Physics Vol. I - by Nicholas Weinsten	R10	Properties of Matter - by D.S. Mathur
R3	Physics Part I & II - by Halliday and Resnick	R11	Light - by Vasudevan
R4	Advanced Level Physics - by Nelkon and Parker	R12	Optics - by Brij Lal and Subrahmanyam
R5	Ordinary Level Physics - by A.F. Abbott	R13	Fundamental of Physics - by Nelkon and Parker
R6	Nuffield Physics - by Longman	R14	Introducing Mechanics - by Jefferson, Brian
R7	Heat and Thermodynamics - by Brij Lal and Subrahmanyam	R15	Understanding Mechanics - by Sadler, A.J.
R8	Sound - by Brij Lal and Subrahmanyam	R17	Basic Engineering Thermodynamics - by Rayner, Joel
R9	Foundation of Fluid Mechanics - by S.W. Yaun	R18	ABC of Physics - by Satish Gupta
R10	Properties of Matter - by D.S. Mathur	R19	Advanced Physics - by Gibbs, Keith
R11	Light - by Vasudevan	R20	Thinking about Physics - by Newton Roger
R12	Optics - by Brij Lal and Subrahmanyam	R21	Electro-Technology - by B.L. Theraja
R13	Fundamental of Physics - by Nelkon and Parker	R22	Principles of Electronics - by V.K. Mehta
R14	Introducing Mechanics - by Jefferson, Brian	R23	Electronic Devices and Circuits - by Allen Mottershead
R15	Understanding Mechanics - by Sadler, A.J.	R24	Electronic Communication Systems - by G. Kennedy

Methodology and Reference Books

Subject Code

UD11T5102

Subject Name **Applied Sciences**

R25	Digital Logic and Computer Design - by M. Morris Man	R32	A Text Book of Electrical Technology in S.I. Units, Vol. 3 : Transmission Distribution and Utilization - by Theraja, B.L.
R26	A Text Book of Electrical Technology - by Theraja, B.L.	R33	A Text Book of Electrical Technology in S.I. Units, Vol. 4 : Electronic Devices and Circuits - by Theraja, B.L.
R27	Marine Electrical Technology - by Fernandez, E.A.	R34	Basic Electronics and Linear Circuits - by Bhargava, N.N.
R28	Basic Electro Technology for Engineers Vol. 6 - by Kraal, E.G.R.	R35	Electronic Devices and Circuit Theory - by Robert L. Boylestad
R29	Advanced Electro Technology for Engineers Vol. 7 - by Kraal, E.G.R.	R36	Electrical and Electronic Technology - by John Hiley
R30	A Text Book of Electrical Technology in S.I. Units, Vol. 1 - by Theraja, B.L.	R37	Marine Electrical Equipment & Practice - by McGeorge, H.D.
R31	A Text Book of Electrical Technology in S.I. Units, Vol. 2 : AC & DC Machine - by Theraja, B.L.		

Detailed Teaching Syllabus

Subject code	UD11T5103	Block 1 Ship Construction
Subject name		Block 2 Ship Stability
Ship Const & Ship Stability I		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Ship Construction	Familiarization with Ship Construction, General drawings, layout, fittings, structures, tanks, etc	1.1	Sketch Plan view & Profile View Of A General Cargo vessel & Gearless Bulk Carrier And Label The Principal Parts (Bow, Stern, Midship, Port, Starboard, Bulbous Bow, Hull, Bridge, Accommodation, Main Mast, Fore Mast, Jack Staff, Ensign Staff, Bridge, Engine Room, Steering Gear Room, Funnel, Upper Deck, Mast House, Crane, Cargo Hold, Hatch Coaming, Hatch Cover, Booby Hatch, Bulwark, Gunwale, Mooring Winch, Windlass, Fairleads, Rollers, Cross Deck, Poop Deck, Fore Castle Deck, Tanks, Fore Peak Tank, Aft Peak Tanks, Double Bottom Tanks, Stores, Chain Locker, Propeller, Rudder, Keel, Gangway, Porthole, Bulkhead, Collision Bulkhead, Manhole, Weather Tight Doors)	K/A	7	T	4	P	R2, R4, R5
		1.2	Define And Illustrate: Camber, Rise Of Floor, Tumblehome, Flare, Sheer, Rake, Parallel Middle Body, Entrance, Run.	K/A					
		1.3	Sketch Double Bottom Tanks, Cargo Tanks, ForePeak Tank and label Principal parts	K/A					
		1.4	Sketch And Label The Following Parts – Sounding Pipes, Air Pipe with Vent Head And Ventilators.	K/A					
	Loadlines, Draft, Ship Dimensions	2.1	Explain The Draft Marks, Plimsoll Line, Deck Line, Load Lines And Freeboard. Importance of Loadlines.	U	5	T	3	P	R2, R4
		2.2	Draw Loadline Marks including Plimsoll for a ship. Label the horizontal & vertical distances (EXCLUDE TIMBER LOAD LINE)	A					
		2.3	Draw Draft marks over 2 meters range (ONLY IN METERS)	A					
		2.4	Define And Illustrate: Forward Perpendicular (FP), After Perpendicular (AP), Length Between Perpendiculars (LBP), Length On The Waterline (WL), Length Overall (LOA), Base Line; Moulded Depth, Beam And Draught; Extreme Depth, Beam, Draught and Air Draft	K					
Ship Stability	Displacement	3.1	Define The Following	K	6	T	6	N	R6, R7, R8, R9
		3.1.1	Density / Relative Density	K					
		3.1.2	Pressure	K					
		3.1.3	Thrust	K					
		3.1.4	Displacement	K					
		3.1.5	Deadweight	K					
		3.1.6	Light Displacement	K					
		3.1.7	Load Displacement	K					
		3.1.8	Deadweight Aboard	K					
		3.1.9	Deadweight Available	K					
		3.1.10	TPC	K					
		3.1.11	Water Plane Coefficient	K					
		3.1.12	Block Coefficient	K					

Detailed Teaching Syllabus

Subject code	UD11T5103	Block 1 Ship Construction
Subject name	Ship Const & Ship Stability I	Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Ship Stability	Displacement	3.1.13	Draft	K				
		3.1.14	Air Draft	K				
		3.1.15	Numericals On Density, Relative Density, Mass/Volume Of Oil In Tank Considering Expansion	A				
		3.1.16	Numericals On Water Pressure And Thrust On Bulkhead, Ship Side, Keel, Manhole Of Tank	A				
		3.2	Describe That For A Ship To Float It Must Displace A Mass Of Water Equal To Its Own Mass (Principle Of Floatation). Numericals Involving Flotation Of Rectangular Box, Cylinder Shaped Body	A				
		3.3	Explain How When The Mass Of A Ship Changes The Mass Of Water Displaced Changes By An Equal Amount.	U				
		3.4	Describe That Displacement Is Represented By The Symbol Δ	U				
		3.5	Explain That Graph Or Scale Can Be Drawn To Show The Relationship Between The Displacement And Mean Draught Of A Ship.	U				
		3.6	Given A Displacement / Draught Curve, Find	A				
		3.6.1	Displacements For Given Mean Draughts	A				
		3.6.2	Mean Draughts For Given Displacements	A				
		3.7	Explain The Change In Mean Draught When Given Masses Are Loaded Or Discharged.	U				
		3.8	Find The Mass Of Cargo To Be Loaded Or Discharged To Produce A Required Change Of Draught (for Even Keel situation)	A				
		3.9	Uses A Dead Weight Scale To Find The Dead Weight And Displacement Of A Ship At Various Draughts In Seawater.	A				
		3.10	Uses A Deadweight Scale To Determine The Change In Mean Draught Resulting From Loading Or Discharging A Given Tonnage.	A				
		3.11	Given The Present Draughts And The Density Of Dock Water, Calculates The Draughts In Sea Water.	A				
		3.12	Uses A Ship's Hydrostatic Particulars And Given Mean Draughts To Determine The Approximate Weight Loaded Or Discharged.	A				
		3.13	Explain Why TPC Varies With Draughts.	U				
		3.14	Use A Dead Weight Scale To Obtain TPC At Given Draughts.	A				
		3.15	Use TPC Obtained From The Displacement To Find :	A				
3.15.1	The Change Of Mean Draught When Given Masses Are Loaded Or Discharged	A						
3.15.2	The Mass Of Cargo To Be Loaded Or Discharged To Produce A Required Change Of Draught. Use Formula : Cargo To Load (Discharge) = Mean Sinkage (Rise) in cm x TPC. Discuss The Limitation Of Formula As It Is True Only For Small Change In Draft.	A						
3.16	Calculate C_b From Given Displacement And Dimensions.	A						

Detailed Teaching Syllabus

Subject code	UD11T5103	Block 1 Ship Construction
Subject name	Ship Const & Ship Stability I	Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Ship Stability	Buoyancy And Fresh Water Allowance	3.17	Calculate Displacement From Given Cb And Dimensions.	A					
		4.1	Explain What Is Meant By "Buoyancy".	U	6	T	7	N	AMSA NOTICE 05/06 R6, R7, R8, R9
		4.2	Define The Force Of Buoyancy As An Upward Force On A Floating Object Created By The Pressure Of Liquid On The Object.	K					
		4.3	State That The Buoyancy Force Is Equal To The Displacement Of A Floating Object. Numericals On Determining Position Of 'Centre Of Buoyancy' And 'Centre Of Gravity' On Box Shaped And Triangular Shaped Vessels.	A					
		4.4	Explain What Is Meant By "Reserve Buoyancy".	U					
		4.5	Explain How Freeboard Is Related To Reserve Buoyancy.	U					
		4.6	Calculate The Reserve Buoyancy Of A Box Shape V/L Whose Dimensions And Displacement Is Known.	A					
		4.7	Explain The Terms "Fresh Water Allowance" & "Dock Water Allowance".	U					
		4.8	Explain Why The Draught Of A Ship Decreases When It Is Passes From Fresh Water To Seawater And Vice Versa.	U					
		4.9	State That When Loading In Fresh Water Before Proceeding Into Seawater, A Ship Is Allowed A Deeper Maximum Draught.	K					
		4.10	State That The Additional Draught Is Called The Fresh Water Allowance (FWA).	K					
		4.11	Given The FWA And TPC For Fresh Water, Calculate The Amount Which Can Be Loaded After Reaching The Summer Load Line When Loading In Fresh Water Before Sailing Into Seawater.	A					
		4.12	Uses A Hydrometer To Find The Density Of Water. Describe The Difference Between Loadline Hydrometer And Draft Survey (Zeal) Hydrometer.	U/A					
		4.13	Given The Density Of Dock Water And Tpc For Sea Water, Calculate The TPC For Dock Water.	A					
		4.14	Given The Density Of Dock Water And FWA, Calculates The Amount By Which The Appropriate Load Line May Be Submerged.	A					
		4.15	Given The Present Draught Amidships And The Density Of Dock Water, Calculate The Amount To Load To Bring The Ship To The Appropriate Load Line In Sea Water.	A					
		4.16	Use Tank Sounding Booklet To Obtain Volume Of Water, KG Of Water, In The Tank For Given Sounding Or Ullage.	A					
		4.17	Calculate Weight Of Water In The Tank.	A					
4.18	Describe Why WNA Mark Is Situated 50mm Below The Winter Line For The V/L Less Than 100m In Length.	U							

Detailed Teaching Syllabus

Subject code Subject name		UD11T5103 Ship Const & Ship Stability I			Block 1 Ship Construction Block 2 Ship Stability				
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Ship Stability		4.19	Given The Summer Draft, Calculate The Distance Between The Winter & Summer, Summer & Tropical Draft.	A					
		4.20	Given The Present Draft, Summer Draft And Tpc, Calculate The Quantity Of Cargo To Be Loaded / Discharged To Reach At Desired Load Line	A					
					24	20	Total 44 Hrs		

Methodology and Reference Books

Subject Code

UD11T5103

Subject Name **Ship Construction & Ship Stability I**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Ship Construction Sketches & Notes - by Kemp & Young	R7	Ship Stability I - by Subramanian, H.
R2	Ship Construction Notes for Ship Mates - by Edrich Fernandes	R8	Ship Stability for Masters and Mates - by Derrett, D.R.
R3	Ship & Naval Architecture - by R. Munro-Smith	R9	Stability Tables : Trim and Stability Particulars of M.V. Hindship - by Bhandarkar
R4	Ship Constructions - by D.J. Eyres	R10	Ship Stability OOW - by Martin Rhodes
R5	Ship Construction for Marine Engineer - by Stroke		
R6	Stability, Trim and Cargo Calculations on M.V. Hindship and Oil Tankers - by Joseph and Rewari		

Detailed Teaching Syllabus

Subject code	UD11T5104	Block 1 Terrestrial Navigation
Subject name		Block 2 Celestial Navigation
		Block 3 Chart Work (Practical Navigation)
Nav I: Navigation & Chartwork		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Terrestrial Navigation	Earth	1.01	Explain With Diagrams: 'Great Circle', 'Small Circle'.	U	3	L	3	N	FIND LOCATION OF CAMPUS IN GEOGRAPHICAL COORDINATE SYSTEM R1, R2, R12, R14, R19
		1.02	Explain With Diagrams: 'Earth's Axis', 'Earth's Poles', 'Equator' And 'Meridians'.	U					
		1.03	Explain With Diagrams: 'Latitude' And 'Parallels Of Latitude', 'Prime Meridian And 'Longitude'.	U					
		1.04	Explain With Diagrams: Difference Of Latitude And Difference Of Longitude.	U					
		1.05	Explain 'Sea Mile', And 'Nautical Mile', Geographical Mile And Statute Mile, Comparison Of Nautical Mile With Kilometre, 'Cable' And Explanation Of 'Knot' As A Unit Of Speed.	U					
		1.06	Explain Directions on Earth surface & related terms such as True North, Magnetic North, Compass North, Gyro North, Compass Error, Deviation, Variation, Gyro error	A					
	Parallel And Plane Sailing	2.01	Explain With Diagrams : 'Departure' And Explain Its Relationship With Difference Of Latitude, Distance And Difference Of Longitude.	U	2	L	4	N	R1, R2, R12, R14, R19
		2.02	Explain With Diagrams: 'True Course' And Rhumb Line.	U					
		2.03	Describe The Limitations Of The Plane Sailing Formulae.	A					
		2.04	Calculate The Course And Distance Between Two Positions Using The Parallel Or Plane Sailing Formula.	A					
	Mercator Sailing	3.01	Describe The Mercator Chart, Mercator Projections.	U	2	L	4	N	R1, R2, R12, R14, R19
		3.02	Define Meridional Parts And DMP. Explain The Use Of Meridional Parts Table	U					
		3.03	List Advantages Of Mercator Sailing Over Plane Sailing.	K					
		3.04	Solve Problems Of Mercator Sailing, Compass Corrections (Variation And Deviation, True Course. Magnetic Course, Compass Course).	A					
Celestial Navigation	Celestial Sphere	4.01	Define The Celestial Sphere, Celestial Poles, Declination-circles, Celestial Meridians And Equinoctial	K	2	L		Uses Equinoctial Coordinate System For Star Identification On Star Chart and Identifies Stars R1, R2, R3, R4, R6, R13, R15, R21	
		4.02	Explain The Apparent Annual Motion Of The Sun, The Concept Of The Ecliptic And The 'Obliquity Of The Ecliptic', First point of Aries, First point of Libra	U					
	Sextant And Altitude Correction	5.01	Define 'Sextant Altitude', Zenith, Nadir, Vertical Circles, Prime Vertical, Principal Vertical	K	2	L	3	N	Minimum Two Practical Observations To Be Made For Finding Index Error Using Sun R1, R2, R3, R4, R6, R13, R15, R21

Detailed Teaching Syllabus

Subject code	UD11T5104	Block 1 Terrestrial Navigation
Subject name	Nav I: Navigation & Chartwork	Block 2 Celestial Navigation
		Block 3 Chart Work (Practical Navigation)

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
		5.02	Define 'Visible', Sensible' And 'Rational' Horizons.	K			Observe Altitude Of Sun Above A Given Horizontal Surface		
		5.03	Define 'Observed Altitude', 'True Altitude', 'True Zenith Distance' & 'True Azimuth'	K					
		5.04	Define 'Dip', 'Refraction', 'Semi-Diameter' And 'Parallax', And Explain Their Causes.	K					
		5.05	Apply Index Error To Obtain Observed Altitude Of Sun.	A					
		5.06	Apply The Corrections To Obtain True Altitude Of Sun.	A					
		5.07	Uses Of The Altitude Correction Tables In The Nautical Almanac For Sun.	A					
		5.08	Calculate True Zenith Distance From True Altitude.	A					
ChartWork (Practical Navigation)	Fammiliarization with Charts	6.01	Familiarization With Charts. Recognize following information on Charts – Source Data, Scale, Colors Used, Corrections, Date Of Publication, Edition, Publisher, Hydrographer, Chart Title, Chart Number, Datum - Chart Datum, Height Datum, Position Datum	K	10	L	8	DN	R1, R10, R11, R16,R17, R18, R20, R22, R23,
		6.02	Recognize The Symbols Used On Charts As Given In Int 5011. Limited To Following Symbols - Rock, Wreck, Obstructions, Nature Of Sea Bed, Tidal Stream, Current, Offshore Installation, Platform, Mooring, Submarine Cable, Submarine Pipeline, Tide And Current, Depths, Tracks, Routes, Areas And Limits, Pilot Boarding Place, Tidal Levels	K					
		6.03	Basic Symbols Of 5012 (Ecdis) [LIMITED TO Isolated danger mark, Undefined or Doubtful (Point feature or Area of low accuracy), Simplified symbols for Fixed & Floating Marks under IALA (Lateral, Cardinal, Isolated Danger, Safe Water, Special), CATZOC (A1,A2,B,C,D,U), Caution Area, Restricted Area, Foul area not safe for navigation, Rock which covers and uncovers or is awash at low water]	K					
		6.04	Explain The Use Of Notices To Mariners, Cumulative Notices To Mariners.	U					
		6.05	Explain The Principles And Rules Of The International Association Of Lighthouse Authorities (IALA), Maritime Buoyage System, Systems 'A' And 'B'.	U					
		6.06	Interpret Depths And Nature Of Bottom.	A					
		6.07	Recognize Traffic Lanes And Separation Zones.	A					
		6.08	Define Chart Projections (Limited To Mercator And Gnomonic Projection	K					
		6.09	Define 'Natural Scale' Of A Chart	K					
		6.10	Explain Types Of Charts: Small Scale, Large Scale, Meteorological Charts, Routeing Charts, Harbour Charts Etc.	U					
		6.11	Explain The Use Of Indian And Admiralty Chart Catalogue & Folio System	U					
		6.12	Measure The Distance Between Two Positions On A Mercator Chart.	A					

Detailed Teaching Syllabus

Subject code Subject name	UD11T5104 Nav I: Navigation & Chartwork	Block 1 Terrestrial Navigation Block 2 Celestial Navigation Block 3 Chart Work (Practical Navigation)
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BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
ChartWork (Practical Navigation)	Directions	7.01	Define Directions On The Earth's Surface.	K				Convert True Courses To Compass Courses & Vice Versa	
		7.02	Describe The Direction Of The Ship's Head On A Gyro Compass (Gyro Course).	U					
		7.03	Describe The Direction Of The Ship's Head On The Magnetic Compass (Compass Course).	U					
		7.04	Defines True, Magnetic And Compass North.	K					
		7.05	Finds Deviation And Variation From Tables And Charts.	A					
		7.06	Calculate True Course From Compass Course And Vice Versa.	A					
		7.07	Measure Compass Error, Using A Transit Bearing.	A					
		7.08	Obtain Magnetic/ Gyro Compass Error. Apply Compass Error To The Ship's Head And Compass Bearings To Convert To True.	A					
	Position Lines And Position	8.01	Define a position. Plot a position on chart using latitude / longitude values from GPS.	K	2	L	6	E	R1, R2, R5, R17
		8.02	Plot Position Circle On A Chart, Given The Radar Distance Off A Charted Object.	A					
		8.03	Plot A Position On The Chart From Simultaneous Cross Bearings, Simultaneous cross ranges And From Bearing And Distance Off.	A					
		8.04	Define "Dead Reckoning Position (DR)", "Estimated Position" And "Fixed Position".	K					
		8.05	Find A Position By Bearing, Transit Line. Find Compass Error From Transit Bearing	A					
		8.06	Find The Distance That The Ship Will Pass Off A Given Point When Abeam.	A					
		8.07	Find Course To Steer To Pass A Given Lt.Ho When Abeam At A Particular Distance, When At An Angle On Bow / Aft Or Forward Of Beam At A Particular Distance. Find ETA at the said positions.	A					
	Chart Work Exercises	9.01	Define 'Course' And 'Distance'.	K	1	L	4	E	R2, R5, R7, R8, R9, R17
		9.02	Lay Off True Course Between Two Positions.	A					
		9.03	Find The Distance Between Two Positions.	A					
		9.04	Calculate The Speed Between Two Positions.	A					
		9.05	Explain The Term 'Running Fix' And Use The Method To Plot A Position ONLY WITH BEARINGS (Without Current).	U					
	Electronic Chart Display & Information System (ECDIS)	10.01	Expand the Acronym – ECDIS (Electronic Chart Display & Information System) & relate the two functions – Electronic Chart Display and Information System.	K	9	L			R25, R26, R27
		10.02	Explain the analogy "Fuel" to "Electronic charts" and "Engine" to "ECDIS software". Know that "fuel" is developed by NHOs and "engine" 'compatible with fuel' by OEMs (ECDIS manufacturers)	K					

Detailed Teaching Syllabus

Subject code Subject name		UD11T5104 Nav I: Navigation & Chartwork		Block 1 Terrestrial Navigation Block 2 Celestial Navigation Block 3 Chart Work (Practical Navigation)				
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
ChartWork (Practical Navigation)		10.03	State that IMO adopted performance standards for electronic charts first time in the 1990s, then in 2000 adopted a revised regulation in SOLAS chapter V - Carriage requirements for shipborne navigational systems and equipment to allow an ECDIS to be accepted as meeting the chart carriage requirements of the regulation	K				R25, R26, R27
		10.04	State that IMO, in 2009, recognizing the advantages of ECDIS for navigation, adopted further amendments to SOLAS regulation V/19, to make mandatory the carriage of ECDIS.	K				
		10.05	State that the 2009 amendments entered into force on 1 January 2011, making ECDIS mandatory for new ships built after set dates and also phasing-in the requirement for existing ships.	K				
		10.06	List various stake holders in the evolution of ECDIS such as IMO, IHO, NHOs, RENCs, OEMs and IEC. Explain briefly (maximum 5 lines only) the role of these stakeholders.	K				
		10.07	Explain the objective behind WEND principles as promoted by IHO (maximum 5 lines)	K				
		10.08	Explain the terms – ENC, RNC, Official and Unofficial charts, ECDIS mode & RCDS mode.	K				
					33	32	Total 65 Hrs	

Methodology and Reference Books

Subject Code

UD11T5104

Subject Name **Navigation I: Navigation & Chartwork**

TEACHING METHODOLOGY			
L	Lecture (Hours)	P	Practical (Hours)
N	Numerical (Hours)	E	Exercise (Hours)
		D	Demonstration

Cognitive Levels : K - Knowledge U - Understanding A - Application

REFERENCE BOOKS & PUBLICATIONS (R) LIST

R1	Principles of Navigation - by S.S.S. Rewari and Capt. T.K. Joseph	R13	The Admiralty Manual of Navigation - Astro Navigation : Vol. 2 - by Nautical Institute
R2	Practical Navigation - by Capt. H. Subramaniam	R14	Navigation Guide - Vol 1 : Near Coastal Navigation - by Alexander Simpson
R3	Nories Nautical Table	R15	Navigation Guide - Vol 2 : Celestial Navigation - by Alexander Simpson
R4	Nautical Almanac	R16	Compass - Wise or Getting to know your Compass - by Klinkert, J.
R5	Chartwork - by Capt. S.K. Puri	R17	Practical Navigation for Officers of the Watch - by Frost, A.
R6	Brown's Nautical Almanac - by Brown	R18	Nicholl's Concise Guide to the Navigation Examinations Vol. 2 - by Edward J. Coolen
R7	Modern Chartwork - by Squair, W.H.	R19	Nav Basics - The Earth, The Sailings, Tides & Passage Planning Vol. 1 - by Witherby Seamanship International Ltd.
R8	Chartwork for Mariners - by Puri, S.K.	R20	Cumulative List of Admiralty Notices to Mariners - by Hydrographic Office
R9	Chart Work : Basic Concepts and Miscellaneous Calculations - by Chaudhari S.S.	R21	Nav Basics - Ocean Offshore and Celestial Navigation Vol. 2 - by Witherby Seamanship International Ltd.
R10	Chart Correction Log - by Admiralty Charts and Publications	R22	Admiralty Notice to Mariners - by Hydrographic Office
R11	Catalogue of Admiralty Charts and Publications - by Admiralty Charts and Publications	R23	Compass Observation Book - by Plain Brown and Sons
R12	The Admiralty Manual of Navigation - Principles of Navigation : Vol. 1 - by Nautical Institute	R24	Lloyd's Maritime Atlas - 25th Edition
R25	IMO 1.27 (ECDIS Model Course)	R27	ECDIS BLUES by Capt Vincent Fernandes
R26	MSC 232(82), ECDIS Performance Standards		

Detailed Teaching Syllabus

Subject code	UD11T5105	Block 1 Bridge Equipment & Watchkeeping
Subject name		Block 2 Meteorology
Nav II: Bridge Equipment, Watchkeeping & Meteorology		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Bridge Equipment And Watch Keeping	Navigational Aids	1.1	Explain use of sextant & its principle and errors.	U	15	6		
		1.2	Describe and sketch the layout of the bridge with its navigational equipment.	U/A				
		1.3	Describe the principle of magnetic compass and its care. Explain the meaning of "lubber line".	U				
		1.4	State that 'gyro compass' is an electrically powered direction finding device used on board ships and points to 'true north' (geodetic north) direction on the earth.	K				
		1.4.1	List out the 'advantages' and 'disadvantages' of the 'gyro compass over the 'magnetic compass'.	K				
		1.4.2	State that ship's heading information from the main 'gyro compass' is transmitted to many other 'gyro repeaters' fitted at different locations on board as well as to various other electronic navigational equipments.	K				
		1.4.3	State that 'gyro compass' takes some time to settle down/ stabilize after being switched on whenever there is a power shut down.	K				
		1.4.4	State that, it is a regulatory requirement that readings of Gyro compass, magnetic compass and all gyro repeaters are compared and checked for correctness atleast once during every watch at sea and whenever ship's course is altered.	K				
		1.5	Explain echo sounder, its principle and working.	U				
		1.6	State that "azimuth reading device" (commonly called as "azimuth mirror") is used for taking the bearings of terrestrial and celestial objects	U				
		1.7	Explain Different Modes Of Steering; 'Follow-Up' And Non- Followup' Describe Procedure For Change-Over From Hand Steering To Auto-Pilot And Back Describe Various 'Controls' Fitted On 'Steering Console' And Their Purposes.	U				
		1.7.1	Describe Purpose Of 'Off-Course' Alarm State That It Is Mandatory Requirement That, Auto-Pilot Be Changed Over To 'Hand Steering' Mode And Tested Under The Supervision Of Officer Of Watch At Least Once During Every Navigational Watch At Sea Before Entering 'Coastal/ Congested Waters'.	U				
		1.8	Explain following wrt Course Recorder - Purpose, Importance, Principle Of Working, And Marking Of The Events	U				
		1.9	Explain Speed Log Principle And Operations Of Doppler, Electromagnetic Logs.	K				

Detailed Teaching Syllabus

Subject code Subject name	UD11T5105 Nav II: Bridge Equipment, Watchkeeping & Meteorology	Block 1 Bridge Equipment & Watchkeeping Block 2 Meteorology
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BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	Conduct Of Vessels In Any Condition Of Visibility, Sight Of One Another & In Restricted Visibility (Limited To Rules (1 To 18)	2.1	Explain that the officer of the watch is responsible for Navigating safety, with particular regard to avoiding collision and stranding and with reference to STCW CH VIII and understand that IRPCS (Colregs) is a convention and must be mandatorily applied.	U	8	5		R1, R5, R7, R2, R16, R20, R21, R25
		2.2	Describe the procedures of keeping a lookout, duties of lookout.	U				
		2.3	Explain the general definitions, which apply throughout the rules.	U				
		2.4	Explain the term "vessel constrained by her draught".	U				
		2.5	Distinguish between 'under way' and 'making way'.	U				
		2.6	Explain the term "vessel restricted in her ability to maneuver".	U				
		2.7	Explain what is meant by vessels in sight of one another.	K/U				
		2.8	Explain safe speed. State the factors to be taken into account in determining a safe speed.	U				
		2.9	Describe how the use of radar affects determination of safe speed.	U				
		2.10	Explain what is meant by risk of collision.	U				
		2.11	Describe how the radar equipment is used in determining whether risk of collision exists.	U				
		2.12	Explain the dangers of making assumptions on the basis of scanty information, citing example from clear weather as well as the use of radar. Understand the benefit of long range scanning and systemic planning.	U				
		2.13	Explain how failure to plot the target ship may lead to a lack of appreciation of a developing situation.	U				
		2.14	Explain the following actions to avoid collision referred to in rule 8: positive action in ample time large enough to be readily apparent, alteration of course alone, passing at a safe distance, checking the effectiveness of action taken, reduction of speed, taking all way off, finally past and clear.	U				
		2.15	Describe how 'proper and effective action' and 'within a distance appropriate to the prevailing circumstances and conditions' may be interpreted.	U				
		2.16	Explain how to decide when a vessel is overtaking vessel.	U				
		2.17	Explain the application of rules 14, 15.	U				
	2.18	Explain how to decide when to take avoiding actions as stand on vessel.	U					
	2.19	Explain the actions which may/must be taken by stand on vessel.	U					
	2.20	Describe rule 18 - Responsibility between vessels - its application.	U					
	2.21	Define 'traffic lane', 'separation lane', 'separation zone', 'inshore traffic zone'.	U					

Detailed Teaching Syllabus

Subject code Subject name		UD11T5105 Nav II: Bridge Equipment, Watchkeeping & Meteorology			Block 1 Bridge Equipment & Watchkeeping Block 2 Meteorology			
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
		2.22	Describe how to navigate in a traffic separation scheme with reference to -	U				
		2.22.1	entering and leaving the traffic separation scheme					
		2.22.2	entering and leaving traffic lanes					
		2.22.3	crossing lanes					
		2.22.4	the use of inshore traffic zones					
		2.22.5	crossing separation lines or entering separation zones other than when crossing, joining or leaving a lane					
		2.23	List the requirements for vessels -	U				
		2.23.1	navigating in areas near the termination of Traffic separation schemes					
		2.23.2	anchoring					
		2.23.3	not using a traffic separation scheme					
		2.23.4	engaged in fishing					
		2.24	State that a vessel of less than 20 meters in length or a sailing vessel must not impede the safe passage of a power driven vessel when following a traffic lane.	U				
		2.25	With regards to Rule 9 -	U				
		2.25.1	Defining the terms 'narrow channel' and 'fairway'					
		2.25.2	Describing how to proceed along the course of a narrow channel					

Detailed Teaching Syllabus

Subject code Subject name	UD11T5105 Nav II: Bridge Equipment, Watchkeeping & Meteorology	Block 1 Bridge Equipment & Watchkeeping Block 2 Meteorology
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BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
		2.25.3	Describing the navigation of a small craft					
		2.25.4	Listing the restrictions on crossing the channel on fairway					
		2.25.5	Describing the conduct of vessel engaged in fishing					
		2.25.6	Describing the procedure for overtaking in a narrow channel					
		2.25.7	Describing the actions to be taken on nearing a bend in narrow channel or fairway					
		2.25.8	Describing that a sailing vessels in a narrow channel shall not impede the passage of a vessel which can only navigate safely in a narrow channel					
	Light, Shapes And Sound Signals (Rules No. 20, 21, 22)	3.1	Rule 20 - Application	K	2	1		R2, R4, R25
		3.2	Rule 21 - Definitions	K				
		3.3	Rule 22 - Visibility of Lights	K				
Meteorology	Meteorology	4.1	Describe the composition of the earth's atmosphere.	U	18	5	CALCULATING DEW POINT CARGO SWEAT SHIP SWEAT	R9, R10, R12, R17, R18, R19, R22, R23, R24
		4.2	Define troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause and thermosphere.	K				
		4.3	Explain atmospheric pressure, pressure gradient, barometric tendency, isobar, and the relationship between atmospheric Pressure and height above sea level.	U				
		4.4	Sketch and explain the working of aneroid barometer and anemometer	U/A				
		4.5	Describe the nature of solar radiation (reflection, absorption and scattering).	U				
		4.6	Explain heat exchange processes (conduction, convection and radiation).	U				
		4.7	Describe environmental lapse rate, inversion and diurnal, seasonal and geographical variation of temperature.	U				
		4.8	Define specific, absolute and relative humidity. Explain saturation, dew point and outline knowledge of hydrological cycle (evaporation, condensation and precipitation).	K/U				
		4.9	Explain Fundamentals Of Condensation	U				
		4.10	Describe Various Condensation Forms. Explain Precipitation, Drizzle, Hail, Snow, And Sleet	U				
					43	17	Total 60 Hrs	

Methodology and Reference Books

Subject Code

UD11T5105Subject Name **Navigation II: Bridge Equipment, Watchkeeping & Meteorology**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Bridge Watchkeeping - by Capt. H. Subramaniam	R14	International Cloud Atlas
R2	IMO Rules of the Road - by Bhandarkar Publicatios	R15	Routing Charts - by British Admiralty
R3	Rules of the Road Manual - by Capt. Puri S.K.	R16	Collisions and their Causes - by Cahill, Richard
R4	International Lights, Shapes and Sound Signals - by D.A. Moore	R17	Meteorology Demystified : Self Teaching Book - by Gibilisco Stan
R5	Bridge Procedure Guide - by ICS	R18	Ship's Code and Decode Book- by Met. Office
R6	Bridge Teamwork - by Nautical Institute	R19	Notes on Meteorology - by Kemp
R7	A Guide to the Collision Avoidance Rules - by Cockcroft and Lameijer	R20	A Seaman's Guide to the Rules of the Road - by Morgans Technical Books Ltd.
R8	Admiralty Manual of Navigation - by HMSO	R21	International Regulations for Preventing Collisions at Sea - by Nautical Press
R9	Marine Meteorology - by Capt. H. Subramaniam	R22	Dynamical Meteorology : An Introductory Selection - by Atkinson, B.W.
R10	Meteorology for Mariners - by HMSO Publications	R23	Meteorology at Sea - by Sanderson Ray
R11	Ship Weather Code - by Vijaya Publications	R24	Meteorology - by Charles W. Roberts
R12	Meteorology for Seafarers - by P.A. Uttridge	R25	A Mariners Guide to Preventing Collisions - by Capt. Y. Chhabra
R13	Mariners Handbook - by HMSO Publications		

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name		Cargo Handling, Stowage and Seamanship I

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Cargo Handling And Stowage	"Categories Of Cargo & Types Of Ships"	1	Classify The Ships As Per Cargo Carried On Board As Given Below:	U	6			
		1.1	Dry Cargo Ships:					
		1.1.1	Ships Carrying Dry Cargo In Bulk Form- Bulk Carrier Ships Carrying Cargo Inside Unitized Containers -Container Vessel Ships Carrying General Cargo In Bags, Units, Bundles - General Cargo Vessel					
		1.2	Liquid Cargo Carriers:					
		1.2.1	Ships Carrying Crude Oil Or Any Other Petroleum Byproducts - Oil Tanker					
		1.3	Ships Carrying Chemicals In Liquid Form - Chemical Carrier Ships Carrying Liquified Gases - Gas Carrier					
		1.4	Other Miscallaneous Types:					
		1.4.1	Ships Carrying Passengers - Passenger Vessels Ships Carrying 'Refrigerated Cargo' - Reefer Vessels Ships Carrying Aumobiles Are Cargo - Roro Vessels Ships Carrying Live-Stock - Livestock Carrier Ships Engaged In Fishing - Fishing Vessel - Ships Engaged In Offshore/ Rigs Support -Offshore Supply Vessel, Tugs, Dredgers. Brief Overview Of Dynamic Positioning Ships					
	Principles Of Cargo Work & Port Watch Keeping In (General Cargo Ships)	2.1	Define: 'Stowage Factor' 'Bale Capacity', 'Grain Capacity' 'Broken Stowage'	K/A	10	4	SIMPLE NUMERICAL ON VOLUME WEIGHT AND STOWAGE FACTOR	R27, R30, R31, R32, R33, R34, R35
		2.2	Define: 'Load Density' And 'Permissible Load Density' (PLD) Solve Simple Excercises Involving Calculation Of Cargo Loaded, Given Volume Of Holds, Stowage Factor And Broken Stowage.	U				
		2.3	Solve Simple Exercises Involving Calculation Of Maximum Height To Which Cargo Can Be Loaded In A Hold, Given The PLD Of The Hold.	A				
		2.4	State That For The Purpose Of Freight Calculations, Cargo Which Has Stowage Factorless Than 1.2 M3/Tonne Is Considered As ' Deadweight Cargo' And Having Sf More Than 1.2 M3/Tonne Is Considered As 'Measurement Cargo'.	U				
		2.5	State That Freight For 'Deadweight' Cargo Is Calculated By Weight Of Cargo And For'measurement Cargo' Freight Is Payable By The Volume Occupied By Cargo.	K				
		2.6	Solve Simple Exercises Involving Calculation Of Cargo To Be Loaded For Maximizing The Freight Earned By Loading An Optimum Mix Of 'Deadweight Cargo' And 'Measurement Cargo' In The Available Hold Space.	A				

Detailed Teaching Syllabus

Subject code Subject name	UD11T5106 Cargo Handling, Stowage and Seamanship I	Block 1 Cargo Handling & Stowage Block 2 Seamanship & COSWP
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BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
		2.7	State That Each Ship Is Provided With A Capacity Plan, Which Gives The Information Relating To The Location And Volume Of All Cargo Compartments (Bale As Well As Grain capacity), Location Of Ballast Tanks, Fuel Oil Tanks Along With Their Cubic Capacities.	U				
	Principles Of Cargo Work & Port Watch Keeping In (General Cargo Ships)	2.8	State That "Plimsoll Mark" Is A Reference Mark Located On The Ship's Hull, Amidships, Which Indicates The Maximum Depth To Which The Vessel May Be Safely Immersed When Loaded With Cargo.	K				
		2.9	State That A Vessel While Passing Through A "Load Line Zone" Is Not Allowed To Exceed The Draft As Allowed For That Zone.	K				
		2.10	Familiarize With 'Load Line Zones' And 'Seasonal Load Line Zones' As Given On BA Chart D6083 Or Any Other Similar 'Load Line Zone Charts'.	U				
		2.11	Explain How To Calculate 'Quarter Mean' Draft From All Six Drafts Of A Vessel	A				
		2.12	State That By Monitoring The Ship's "Draft Readings" And Knowing The Corresponding 'displacements', A Ship's Officer Can Roughly Calculate The Amount Of Cargo Loaded / Discharged.	K				
		2.13	Solve Simple Exercises Involving Calculation Of Cargo Loaded / Discharged Given The Mean Drafts And Corresponding Displacements On Consecutive Days And Other Applicable Deductibles.	A				
		2.14	Describe Basic Of Cargo Planning And Basic Understanding Of Load Distribution. General Idea of Cargo Stowage Plan	U				
		2.15	Describe Briefly Stowage, Segregation And Separation O Cargoes.	U				
		2.16	Describe Basics Of Ballasting / De-Ballasting Includin Stripping.	U				
		2.17	Describe Basic Purpose Of Inspections Required For Cargo Spaces, Hatch Covers And Ballast Tanks.	U				
		2.18	Describe Briefly Use Of Dunnage: Purpose, Different Ways Dunnage Used Namely: Bottom, Top, Interlayer & Lateral.	U				
	Loading Of Dry Cargo & Regulations	3.1	State That The Requirements For The Extend Of Cleaning Required Of A Cargo Hold Will Be Depended On, The Previous Cargo Carried And The Next Cargo To Be Carried The Special Requirements If Any Of The Charterers, Shippers, Receivers And/Or The Authorities At The Port Of Loading	K	12	1		R27,R28, R32, R33, R34
		3.2	State That After Discharge Of Cargo, Holds Should Be Thoroughly Cleaned By Sweeping, Scraping And High-Pressure Washing To Remove All Previous Cargo Residues And Any Loose Scale Or Paint	K				

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name		Cargo Handling, Stowage and Seamanship I

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
		3.3	State That Sometimes The Previous Cargo May Leave Some 'Greasy Deposits' On The Bulkheads Which Will Then Require A 'Degreasing Chemical Wash' (With Permitted Environmental Friendly Chemicals) Followed By A Fresh Water Rinse For Cleaning The Hold.	K				
		3.4	List Out The Steps For Preparing A Hold Which Was Previously Loaded With A Bulk Cargo For Loading Next Cargo As Stated Below -	U				
		3.5	Holds Are To Be Swept Thoroughly After Discharge And Any Previous Cargo Residues Collected For Disposal Ashore	U				
	Loading Of Dry Cargo & Regulations	3.6	Holds And All Its Internal Structures Are Checked For Any Damages Caused During Discharging	U				
		3.7	Bilge Wells & Strum Boxes To Be Cleared Of Cargo Spillages And Any Odour	U				
		3.8	Bilge Sounding Pipes And Temperature Pipes Are Checked Whether Clear	U				
		3.9	The Bilge Lines Leading To Any Other Cargo Holds Which Is Still Having Cargo Is Blanked Off To Prevent Any Leakages During Washing Of Holds	U				
		3.10	Fixed Fire Extinguishing Lines Leading To The Hold Should Be Blown Through By Compressed Air To Clear It Off Any Dust And Debris	U				
		3.11	The Non-Return Valves In The Bilge Well Are Checked Whether Operational	U				
		3.12	Bilge Cover Plate Should Be Covered With Burlap Cloth And Secured	U				
		3.13	Ensure That All Manhole Lids Inside The Hold (And Ballast Line Blanks In Heavy Weather Ballast Hold) Are Watertight With No Signs Of Any Leakage	U				
		3.14	Test All High-Level Bilge Alarms And See Whether Alarm Is Operational	U				
		3.15	Inspect All Pipe Lines (Sounding Pipes, Air Pipes And Any Other Pipe Lines) Leading Through The Hold To Check For Of Any Leakages	U				
		3.16	After Washing, Ensure That Holds Are Well Ventilated And Dried Before Next Cargo Can Be Loaded And All Hold Ventilation Systems And Their Closing Arrangements Are Checked For Their Correct Operation	U				
		3.17	A Hose Test (Or Ultra-Sound Test) Of Hatch Cover and Access Hatch Lids Are Carried Out To Check For Weather Tightness	U				
		3.18	State That There May Be Some Accumulation Of Water In The Bilge Wells Of Holds During The Voyage (Due To Condensation, Any Drippings From Cargo, Any Leakages Within The Hold Etc.) And Which Require Regular Monitoring Through Daily Soundings.	K				
		3.19	State The Additional Precautions To Be Taken While Loading/Carrying/Discharging A Cargo Which Is Liable To Catch Fire.	U				
	3.20	List Various Cargo Handling Gear Used On Dry Cargo Ships: Cranes, Grabs, Various Types Of Slings. Purpose of Safety cut-off limits (Limit Switches)	K					

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name	Cargo Handling, Stowage and Seamanship I	Block 2 Seamanship & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	Care of Cargo Onboard Ship & Documentation	3.21	Describe The Needs For Proper Securing Of Cargo And Effective Monitoring Of The Securing Arrangements.	U	4	1		R29
		3.22	Describes The Basics Of Securing Of General Cargo And Containers Using Equipments As Specified In A Ships Cargo Securing Manual.	U				
		4.1	Describe Ventilation and control of ship & cargo sweat. Describe the system of natural ventilation and forced ventilation.	U				
		4.2	Describe how Temperature control is done.	U				
		4.3	Describe ways for Prevention of ingress of water.	U				
		4.4	Describe Fire controlling methods and Basic understanding of the fire triangle.	U				
Seamanship & COSWP	Rope Work	5.1	Explain the construction, care and maintenance of natural fibre, synthetic fibre ropes including uncoiling, coiling, stowing.	U	12	3	Simple Numerical on Safe working Load, Mechanical Advantage, Velocity Ratio, Effort, Load, Efficiency	R21, R22, R23
		5.2	Explain the construction, care and maintenance of wire ropes including uncoiling, coiling, stowing, opening new coil of wire rope, cutting wire rope, flaking and removing kinks.	U				
	Blocks, Purchases & Lifting and Mooring Appliances	6.1	Explain the different types of tackles and purchases and the power gained in each case.	U/A				
		6.2	Describe the relationship between the diameter of sheave and diameter of rope.	U/A				
		6.3	Explain the markings on block, shackles.	U				
		6.4	Explain the use of sen-house slip, where it is used.	U				
		6.5	Explain the use of swivels.	U				
		6.6	Explain mooring arrangements, effect of mixed mooring, use of rat guards, danger of bights, danger of vertical leads, mooring terms, securing ropes to bitts, putting eye of more than one rope to a single bollard.	U				
		6.7	Explain the use of mooring shackle, Tonsberg and Mandel shackle.	U/A				
		6.8	Explain the use of synthetic rope tails with mooring wire.	U				
		6.9	Calculate SWL, Factor of Safety and Breaking Strength.	U				
		6.10	Explain the use of a sledgehammer.	U				
		6.11	Explain the parts of a stockless anchor.	U				
		6.12	Explain Maintenance of the Pilot ladder. PRECAUTIONS WHEN RIGGING PILOT LADDER	U				
6.13	Explain the plugging of scuppers during bunkering, loading and discharging of oil cargo.	U						
6.14	Explain the use of hand lead line.	U						

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name	Cargo Handling, Stowage and Seamanship I	Block 2 Seamanship & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	Corrosion & Its Prevention	7.1	List different type of materials and their uses onboard : Steel, Aluminium, Brass, Wood, Forged Steel, Canvas, Rubber Plastics, Ropes and cordages and Fiberglass.	K				
		7.2	Explain Corrosion Prevention	K/U				
		7.2.1	Describe the Galvanic and Bimetallic corrosion, Sacrificial Anodes	U				
		7.2.2	Explain the method of surface preparation and Painting above and below the water level	U				
		7.2.3	State that the main components of 'Paints' are the 'Pigment' and the 'Vehicle'	K				
		7.2.4	Describe the types of 'vehicles' (or 'Binders') used in paints as'Oxidation Curing' type, 'Physically drying' type and 'Chemically Curing' type.	U				
		7.2.5	State example of each of above type of Paints as given below:Oxidation Curing type - e.g., Alkyd Paints Physically drying type - e.g., Chlorinated Rubber Paints, Vinyl, Coal Tar & Bituminous Paints Chemically curing type - e.g., Epoxy & Polyurethane Paints	U				
		7.2.6	Explain Cathodic protection system.	U				
		7.2.7	Describe storage, handling and mixing of paints.	U				
		7.3	State the causes of corrosion in cargo spaces and ballast tanks and explain how extent of corrosion can be identified and prevented.	K/U				
	COSWP	8.1	Reference to Code of Safe Working Practices: Define "hazard" as a source of potential harm or damage or any situation which has potential for harm or damage	U	12	3	Mooring plans	
		8.1.1	Define "Risk assessment" as a careful examination of hazards that, could cause harm to 'people', 'pollution' of environment, damage to 'property' and/or loss of 'process' (rule of 4 P's)	U				
		8.1.2	State that "Risk" has two elements as given below:	U				
		8.1.3	the 'likelihood' that a hazard may occur;	U				
		8.1.4	the 'consequences' of the hazardous event.	U				
		8.1.5	State that "Risk" can be controlled by one or more of the below actions which are listed in the order of its effectiveness:	U				
		8.1.5.1	Elimination;	U				
		8.1.5.2	Substitution by something which is less hazardous and risky;	U				
		8.1.5.3	Enclosure (enclose the hazard in a way to eliminate/ control the risk)	U				
8.1.5.4		Guarding/Segregating people away from the hazard;	U					
8.1.5.5	Device safer system of work which will reduce the risk to acceptable level	U						
8.1.5.6	By writing down procedures in a way which is known and understood by those affected;	U						
8.1.5.7	By adopting a blend of technical and procedural control;	U						
8.1.5.8	By providing adequate supervision;	U						

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name	Cargo Handling, Stowage and Seamanship I	Block 2 Seamanship & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	COSWP	8.1.5.9	By identification of training needs;	U				
		8.1.5.10	Providing proper Information/Instruction (signs, hand-outs);	U				
		8.1.5.11	By using proper 'Personal Protective Equipment' (as the last resort, if risk cannot be controlled by any other means)	U				
		8.2	State that as per requirements under COSWP, every sea-going ship which has more than five crew members, a Safety Officer needs to be appointed.	K				
		8.2.1	State that it is Safety Officer's duty to do health and safety inspections of every part of the ship at least once in three months, or more frequently if required.	K				
		8.2.2	State that a 'Safety Committee' should be constituted on board ships which must be chaired by the master and should include safety officer as well as elected safety representatives from all departments as its members.	K				
		8.2.3	State that as a general guideline, the 'Safety Committee' should try to meet atleast once about every 4-6 weeks.	K				
		8.2.4	State that it is a mandatory requirement that the relevant extracts of every 'Safety Committee Meeting' minutes be forwarded by the master to the Company (and where appropriate, to the Employers)	K				
		8.3	State that any operation on board ship where the actions of one person may inadvertently endanger another or where a series of actions need to be taken to ensure the safety of those engaged in that operation, a 'Permit to Work' needs to be issued before starting of the work.	K				
		8.3.1	State that a "Permit-to-work" by itself will not make the job safe, but it just contributes towards measures required for safe working	K				
		8.3.2	List the essential conditions to include in a 'permit to work' as given below:	U				
		8.3.2.1	The permit should clearly state the location and details of the work to be done, the nature and results of any preliminary tests undertaken, the measures undertaken to make the job safe and the safeguards that need to be taken during the operation. Explain LOTO (LockOutTagOut)	U				
		8.3.2.2	The permit should clearly specify the period of its validity (which should not exceed 24 hours in any case)	U				
		8.3.2.3	Only the work which is specified on the permit should be undertaken.	U				
		8.3.2.4	Before signing the permit, the authorising officer should ensure that all measures specified as necessary have in fact been taken.	U				

Detailed Teaching Syllabus

Subject code	UD11T5106	Block 1 Cargo Handling & Stowage
Subject name	Cargo Handling, Stowage and Seamanship I	Block 2 Seamanship & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	COSWP	8.3.2.5	The authorising officer retains responsibility for the work until he has either cancelled the permit or formally transferred it to another authorised person who should sign the permit to indicate transfer of full responsibility.	U				
		8.3.2.6	The person responsible for carrying out the work shall counter sign the permit to indicate his understanding of the safety precautions needed.	U				
		8.3.2.7	On completion of the work, that person should notify the responsible officer and get the permit cancelled.	U				
		8.3.2.8	The person carrying out the specified work should not be the same person as the authorising officer.	U				
		8.4	State that "Permit-to-Work" needs to be issued for any critical jobs including:	U				
		8.4.1	Any work in Unmanned Machinery Spaces	U				
		8.4.2	Any work which requires 'Entry into any Enclosed or Confined Space'	U				
		8.4.3	Any work on any Machinery or Equipment which requires power isolation	U				
		8.4.4	Any job involving 'Hot Work'	U				
		8.4.5	Working Aloft or Overside	U				
		8.5	List out the Personal Protective Equipments (PPE) which are appropriate for	K				
		8.5.1	Head protection - Safety helmets, Bump caps Hearing protection - Ear muffs, Ear plugs Face and eye protection - Goggles and spectacles, Facial shields	K				
		8.5.2	Respiratory protection -Dust masks, Respirators, Breathing Apparatus	K				
		8.5.3	Hand and foot protection - Gloves, Safety boots/ shoes	K				
		8.5.4	Body protection - Safety suits, Safety Harnesses, Aprons,	K				
		8.5.5	High visibility suit.	K				
		8.5.6	Protection against drowning - Lifejackets, Buoyancy aids, Lifebuoys	K				
		8.5.7	Protection against hypothermia - Immersion suits, Anti-exposure suits	K				
		8.6	State the precautions needed while attempting to pick up a heavy load from ground using your hands	U				
		8.7	Describe the safety precautions that needs to be taken while,	U				
		8.7.1	Operating any Power Tools and Equipments	U				
		8.7.2	Operating Paint Spraying Equipment	U				
		8.7.3	Attending to the 'Anchoring Station'	U				
		8.7.4	Operating hydraulically operated Hatch covers	U				
		8.7.5	Entering and working in a compartment where storage batteries are kept	U				
		8.7.6	Work involving welding and cutting Familiarize with the different hand movements used by a signalling man for guiding the crane operator as given in COSWP	U				

Detailed Teaching Syllabus

Subject code Subject name		UD11T5106 Cargo Handling, Stowage and Seamanship I			Block 1 Cargo Handling & Stowage	Block 2 Seamanship & COSWP		
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	COSWP	8.8	Identify the colour codes used for following 'Safety Signs' on board and their meaning:	K				
		8.8.1	Prohibitory Signs	K				
		8.8.2	Warning Signs	K				
		8.8.3	Mandatory Signs	K				
		8.8.4	Emergency escape and First Aid signs	K				
		8.8.5	Fire Fighting Equipments sign	K				
		8.8.6	Identify the colour codes used for identifying gas cylinders, pipe lines and fire extinguishers on board	K				
					56	12	Total 68 Hrs	

Methodology and Reference Books

Subject Code

UD11T5106

Subject Name **Cargo Handling, Stowage and Seamanship I**

TEACHING METHODOLOGY			
L	Lecture (Hours)	P	Practical (Hours)
N	Numerical (Hours)	E	Exercise (Hours)
		D	Demonstration

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Cargo Work - by L.G. Taylor	R16	International Code for the Safe Carriage of Grain in Bulk - by I.M.O
R2	Cargo Work for Ships Officers - by Capt. Errol Fernandes	R17	International Code for Safe Carriage of Chemicals in Bulk (IBC Code) - by I.M.O
R3	Cargo Work - by Kemp and Young	R18	International Code for Safe Carriage of Gases in Bulk (IGC Code) - by I.M.O
R4	Seamanship and Cargo Work - by J. Dinger	R19	International Maritime Dangerous Goods Code (IMDG Code) - by I.M.O
R5	Stowage of Cargo - by O.O. Thomas	R20	Admiralty Manual of Seamsnship (Consolidated) London - by HMSO
R6	Watchkeeping Safety and Cargo Management in Port - by Capt. Peter Roberts, N.I.	R21	Seamanship Notes - by Kemp, J.F.
R7	Sea Trading - by William Packard, Fairplay	R22	The Boatswain's Manual - by McLeod, William A. and Miller
R8	Code of Safe Practice for Cargo Stowage and Securing - by I.M.O.	R23	Theory and Practice of Seamanship - by Danton, Graham
R9	Code of Practice: Roll-On/ Roll-Off Ships, Stowage and Securing of Vehicles - by I.M.O	R24	Nicholl's Seamanship and Nautical Knowledge - by Cockcroft, A.N.
R10	Marpol 73/78 Consolidated Edition - by I.M.O	R25	Seamanship Primer - by Dinger, Jagmohan
R11	Load Line Convention 1966 - by I.M.O	R26	Code of Safe Working Practice for Merchant Seaman - by MSA, UK
R12	Dock Safety Regulations - by I.L.O	R27	Steel Carriage by Sea - by Sparks, A.
R13	International Maritime Solid Bulk Cargoes (IMSBC) Code - by I.M.O	R28	Cargo Stowage and Securing - by Bliault, Charles
R14	Code of Practice for Safe Loading and Unloading of Bulk Cargoes (BLU code) - by I.M.O	R29	Shipboard Operations - by Lavery, H.I.
R15	Code of Safe Practice for Ships Carrying Timber Deck Cargoes - by I.M.O	R30	Ballast Water Management Convention - by I.M.O

Methodology and Reference Books

Subject Code

UD11T5106

Subject Name **Cargo Handling, Stowage and Seamanship I**

R31	Storck Guide Stowage & Segregation to IMDG Code - by Storck Verlag Hamburg
R32	The Carriage of Cargoes : Vol.1. The Carriage of Packaged Cargoes and Cargo Units (Including Containers and Vehicles) - by M.C.A
R33	The Carriage of Cargoes : Vol.2. Solid Bulk Cargoes: Instructions for the Guidance - by M.C.A
R34	Illustrated Dictionary of Cargo Handling - by Brodie, P.R.
R35	Thomas Stowage : The Properties and Stowage of Cargoes - by Pepper G.M.

Detailed Teaching Syllabus

Subject code	UD11T5107	Block 1 English
Subject name		English & Human Factors

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
English	Introduction	1.1	Communication: Concept, Process, Forms, Style, Importance of effective communication on-board ship	K/U	6	T		
		1.2	Difference between General and Technical Communication					
		1.3	Barriers to communication and ways to overcome the barriers					
		1.4	Means/Modes of communication on board ship.					
	Introduction to SMCP and English Language among Multilingual Crew:	2.1	Maritime English: Objectives, Definition, SMCP vs General English.	K/U	6	T		
		2.2	Standard Marine Communication Phrases (SMCP): 2.2.1 General - Procedure, Spelling (Phonetics), Responses, Distress/Urgency/ Safety Signals, Corrections, Readiness, Repetition, Numbers, Positions, Bearings, Courses, Distances, Speed, Time, Geographical Names, Ambiguous Words 2.2.2 Glossary - General Terms (limited to mfollowing) - Abandon Vessel, Adrift, Berth, Cable, Capsize, Close up, Convoy, Derelict, Dragging (of anchor), ETA, ETD, Fathom, Fire Patrol, Flooding, Rendezvous, Shackle, Stand-by, Stand-clear, Stand-on, Standing orders, 2.2.3 Onboard Communication Phrases - Standard Wheel Orders, Standard Engine Orders, Anchoring, Tug Assistance, Berthing & Unberthing	K				
	Reading Comprehension	3.1	Comprehension passages - Prose and short stories out of below mentioned:	K/U	10	T		
		3.1.1	The Refugee - K.A. Abbas					
		3.1.2	Happiness 101 - Geeta Padmanabhan					
		3.1.3	A Garden So rich - Christie Craig					
3.2		Integrated Grammar.						
Writing Skills	4.1	Writing Process (identify, organize and list the points/ideas related to a given topic in a proper logical sequence and write a rough draft and final draft), Sentence Structure, Sentence Coherence, Paragraph Writing.	K/U	16	T			
	4.2	Letter Writing: Types, Parts, Style and Tone, Requisition Letter, Grievance Letter, Various applications writing, Resume writing.						
	4.3	Email Writing.						
	4.4	Factual Reports (Informative): Types of Reports (Routine/Special), Incident Report, Accident Report, Visit Report, Feedback.						
	4.5	Log book writing & Diary writing.						

Detailed Teaching Syllabus

Subject code	UD11T5107	Block 1 English
Subject name		English & Human Factors

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Human Factors	Human Factors (Soft Skills)	5	Human Factors:	K/U	14	T		
		5.1	Describe Nature of the job at sea.					
		5.2	Explain demands of the career - technical, practical, physical, emotional and psychological.					
		5.3	HR sessions on following soft skills - Manners, greetings, Mess etiquettes, Email etiquettes, OLQ, Leadership and Teamwork, EQ and Resilience training (crisis management), Anger management, Assertiveness					
		5.4	Physical fitness, health and personal hygiene.					
		5.5	Sketch Company's Organizational Chart.					
		5.6	Describe Shipboard organizational structure.					
		5.7	Describe Functions and responsibilities of shipboard staff.					
		5.8	List cadet's role on board and expectations from him / her					
					52 Hours			

Methodology and Reference Books

Subject Code

UD11T5107

Subject Name **English & Human Factors**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	IMO (2003) IMO Standard Marine Communication Phrases (SMCP) London - by International Maritime Organisation	R4	The Refugee - K.A. Abbas
R2	"Sea-Speak" Training Manual Maritime Communication/Maritime English, Essential English for International Maritime Use - by Pargamon Press UK	R5	Happiness 101 - Geeta Padmanabhan
R3	IMU/BNA - 017 Module on "English & Human Factor"	R6	A Garden So rich - Christie Craig

Detailed Teaching Syllabus

Subject code	UD11P5101	Block 1 Physics
Subject name		Block 2 Electricity & Electronics
Applied Sciences Lab		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
PHYSICS	Miscellaneous & Varied	1.1	Use Of Vernier Calipers And Screw Gauge To Measure Fundamental Quantities.			10	ROPE & WIRE MEASUREMENT	
		1.2	To Determine The Moment Of Inertia Of A Flywheel About Its Own Axis Of Rotation.(Group Activity Of 2-3 Cadets)				GYROSCOPE	
		1.3	Determination Of Angle Of Repose Of Any One Cargo - Grain, Sand, Cement. (Group Activity Of 4-5 Cadets)				BULK CARGOES	
		1.4	Measurement Of Rate Of Flow Of A Liquid Through A Pipe Using Venturimeter.(Group Activity Of 4-5 Cadets)				LIQUID PUMPING OPERATIONS	
		1.5	Determination Of Magnetic Elements.				MAGNETIC COMPASS	
		1.6	Determination Of Focal Length Of A Combination Of Two Convergent Lenses Separated By A Distance.				BINOCULARS	
		1.7	Experiment To Understand Working Principle Of A Photo-Electric Cell (Group Activity Of 2-3 Cadets)				FIRE & SMOKE	
ELECTRICITY & ELECTRONICS	Miscellaneous & Varied	2.1	Identify Electrical Measuring Instruments Such As Multimeter, Tong Tester, Megger And Demonstrates Their Use. Identify The Dangers Of Using Megger On Electronic Circuits. Demonstrate The Ability To Identify Live And Neutral By Using Test Lamp And Multimeter. Identifies The Colour Codes Given To Phase, Neutral And Earth.			10	DETECTION	
		2.2	Measurement Of Current And Voltage (Using Multimeter) In Rc / Rl/ Rcl Circuit.				TEMPERATURE SENSOR, RADAR	
		2.3	Use An Ammeter And Voltmeter To Measure Current, Potential Difference And Resistance In Simple Circuits.					
		2.4	Calibrate Thermistor As A Thermometer.					
		2.5	Amplitude And Frequency Modulation - Modulation Index To Be Measured.					
		2.6	identification Of Components Of A Pcb (Capacitors, Inductors And Resistors)					
		2.7	Identify Various Symbols On An Electronic Circuit Drawing.					
						20	Total 20 Hrs	

Note: All the practical tasks mentioned are to be done individually unless stated otherwise

Detailed Teaching Syllabus

Subject code	UD11P5102	Block 1 Computer Laboratory
Subject name		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Computer Laboratory	Basic Hardware Familiarization	1.1	Explain Types Of Input Devices (Keyboard, Mouse, Pen, And Touch Screen Scanners, Output Devices (Monitor, Printer, Speakers, Projectors) And Of Storage Devices (Hard Disks, Cd- Roms, Dvd-Roms, Usb Storage). Operate Computer And Its Peripherals.	U/A	7	13		R3	
		1.2	Booting The Computer. Common Start-Up Errors And Their Remedies. Connecting Peripherals - Keyboard, Mouse, Monitor, Power Cables, Ups To The Computer And Checking All Connections. Demonstrate Procedure For The Installation Of Setting Up A New Computer Along With Other Peripherals (Keyboard, Scanner, Printer)	A					
		1.3	Demonstrate Keyboard Layout And Functions Of Different Keys.	A					
		1.4	Demonstrate Proper Shut Down Of Pc, And Explain Precautions To Avoid An Improper Shut Down.	A					
		1.5	Identifying The Different Hardware Parts In The Pc.	A					
		1.6	Determining The Configuration Of The Pc.	A					
		1.7	Explain Types Of Central Processing Unit (Processors, Ram, Rom).	U					
		1.8	Demonstrate Procedure For Installation / Replacement / Maintenance Procedures For Hard Disk And Other Peripherals.	A					
		1.9	Explain The Need For Keeping A Back Up Of All Data On Ships.	U					
	Operating System	2.1	Explain The Windows Operating System.	U					R3
		2.2	Develop Files And Folders.	A					
		2.3	Manage Files And Folders- Creating, Opening, Renaming And Deleting Files And Folders. Performing Searches For Specific Files And Folders.	A					
		2.4	Use Common Keyboard Shortcuts To Speed Up Operations.	A					
		2.5	Use Windows' Help.	A					
		2.6	Install/ Uninstall Software.	A					
		2.7	Copy And Burn Cds And Dvd's.	A					
		2.8	Carry Out Zipping And Unzipping Files And Folders.	A					
		2.9	Use Browsers With Internet.	A					
		2.1	Use Email Applications.	A					
		2.11	Use Antivirus Software.	A					
		2.12	Demonstrate Scanning Of Photographs (Size Versus Clarity, Concept Of Dpi) And Attaching It With Email As Correspondence.	A					
		2.13	Determine The Ways To Sort Out / Fix Minor Computer Issues By Using Control Panel Options And Basic Troubleshooting Guidelines.	A					
		2.14	Explain Usage And Understanding Of An Operating System.	U					
		2.15	Explain The Importance Of De-Fragmenting A Drive For Optimum Usage And Speed And Demonstrate Same.	U					
		2.16	List Different Types Of Files (Common File Extensions Used).	K					
		2.17	Demonstrate The Procedure Of Finding/ Sorting / Archiving Files.	A					

Detailed Teaching Syllabus

Subject code	UD11P5102		Block 1 Computer Laboratory
Subject name	Computer Laboratory		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES					
	MS-WORD	2.18	Demonstrate Ability To Hyperlink Documents.	A			CREW DECLARATION, BOND DECLARATION, PROVISION ACCOUNTING	R4					
		3.1	Create And Save Documentation. File (Data) Import and Export features	A									
		3.2	Open, Find, And Rename Files And Folders.	A									
		3.3	Use "Print" Commands.	A									
		3.4	Use "Paragraph" Options, "Bullets" And "Numbering".	A									
		3.5	Use "Formatting Toolbar".	A									
		3.6	Use Spelling And Grammar Checks In The Document.	A									
		3.7	Use "Headers And Footers".	A									
		3.8	Insert Symbols And Pictures.	A									
		3.9	Create Tables In Ms-Word.	A									
	3.10	Convert MS-WORD document into PDF file.	A										
	MS-EXCEL	4.1	Create Workbooks, Working With Rows, Columns, Cells And Worksheets.	A									
		4.2	Insert Pictures And Graphics.	A									
		4.3	Format Cells.	A									
		4.4	Use Conditional Formatting On Data In Cells.	A									
		4.5	Perform Basic Calculations - Add, Subtract, Multiply, Divide.	A									
		4.6	Calculate Averages, Find The Maximum Value.	A									
		4.7	Format Worksheets - Draw Tales, Format Text, Format Cells, Adjust Columns And Rows, Print Worksheets.	A									
		4.8	Manipulate Data - Move, Copy, And Paste, Add/Delete Columns, Add/Delete Rows, Employ Multiple Worksheets, Insert/Delete Worksheets.	A									
		4.9	Advanced Calculations - Create Formulas, Employ The Function Wizard, Add Comments, Create Charts.	A									
		4.10	File (Data) Import and Export features, Convert MS-EXCEL document into PDF file.	A									
	MS- POWER POINT	5.1	Create A Presentation Create A Slide, Add New Slides, Insert Pictures, Format Text, Format Pictures, Preview A Presentation.	A									
		5.2	Insert Tables And Charts, Employ Design Templates, Employ A Master Slide, And Rearrange Slides.	A									
		5.3	Animate Text, Animate Graphics, Create Slide Transitions, Advance Slides Automatically, Preparing Live Presentations, Make Presentations Portable.	A									
		5.4	File (Data) Import and Export features, Convert MS-POWER POINT document into PDF file.	A									
	Networks		6.1	Explain Networking Concepts.					U				R4

Detailed Teaching Syllabus

Subject code Subject name	UD11P5102 Computer Laboratory	Block 1 Computer Laboratory
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BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
	Networks	6.2	Explain Networking Infrastructure (Lan, Wan, Man) And Topologies.	U				R5
		6.3	State The Type Of Network Used In A Company And Its Limitations.	K				
		6.4	Explain The Significance As To How A Networking Can Improve Business Operations.	U				
		6.5	List Basic Network Technology Terms That You Will Want To Know Before Buying Equipment Or Working With A Supplier.	K				
		6.6	Demonstrate The Procedures For Net Working Ship's Computers (Pop).	A				
		6.7	Identifying Network Cable Cat 5 And Cat 6 And Explain Crippling And Punching Of The Network Cable.	A				
		6.8	List Procedure For Trouble Shooting With The Network Cables	K				
		Cyber Security	7.1	Explain Issues Related To E-Mail, Virus Protection, Firewall.				
	7.2		Introduction to Cybersecurity	K				
	7.3		Password Management (Importance and Guideline lines for strong password). Precautions to safeguard against Cyber threat	K				
	7.4		Different types of Cyber Crimes	K				
	7.5		Cyber Security tools.	K				

Reference Books (R) List

R1	Digital Logic and Computer - by Mano, Morris M.
R2	Digital Design - by Mano, Morris M.
R3	Fundamentals of Computer - E. Balaguruswamy
R4	Exploring Microsoft Office - Kevin Wilson
R5	Information Systems Security: Security Management, Metrics, Frameworks and Best Practices - Nina Godbole

Detailed Teaching Syllabus

Subject code	UD11P5103	Block 1	Hydraulics	Block 4	Electrical shop
Subject name	Workshop Practices	Block 2	Pneumatics	Block 5	Carpentry shop
		Block 3	Fitting Shop		

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Hydraulics Shop	Hydraulics Shop	1.1	Identify Various Components Used In Hydraulic System.			7	POWER PACKS, VALVE CONTROL SYSTEMS, FRAMO PUMPS, HATCH COVERS	
		1.2	Interpret Basic Hydraulic Circuit Diagrams .Explain With Sketch The Purpose And Symbols Of Direction Control Valves And Methods Of Their Operation.					
		1.3	Identify Symbols Of Various Accessories Used In Hydraulics Such As Heater, Cooler And Filters , Pressure Control Valves And Flow Control Valves, Actuators And Pumps.					
		1.4	Use Ermeto Type Couplings For Joining Pipes Taking Safety Precautions.					
		1.5	Execute Common Fault Finding And Rectification In Hydraulic System Taking Safety Precautions. (Group Activity Of 2-3 Cadets).					
		1.6	Use The Hydraulic Hand Pump Used For Emergency Operations In The Hydraulic System Taking Safety Precautions.					
		1.7	Carry Out Air Purging In The Hydraulic System Taking Safety Precautions.					
		1.8	Tighten Leaking Hydraulic Connections Taking Safety Precautions.					
		1.9	Demonstrate The Procedure To Clean And Replace Filters In The System Taking Safety Precautions.(Group Activity Of 2-3 Cadets).					
		1.10	Demonstrate The Ability To Prepare And Start A Hydraulic Power Pack System Including Accumulator And Expansion Tanks Taking Safety Precautions. (Group Activity Of 2-3 Cadets).					
		1.11	Demonstrate The Understanding Of Working Of Hydraulic Door Closer Taking Safety Precautions.					
Pneumatics Workshop	Pneumatics Workshop	2.1	Identify The Various Equipment Operated By Pneumatics Such As Pneumatics Wrench, Lights, Grinders, Drilling Machines, Spray Painting Machines Etc. Safety precautions.			7	USE OF AIR MOTORS TOOLS, VALVES, DRILLING MACHINE AUTOMATION AND CONTROL SYSTEMS INCLUDING ESD. Safety precautions. Safety precautions.	
		2.2	Identify Various Components Used In Pneumatics Like Relays, Transmitters, Actuators Etc.					
		2.3	Identify Symbols Used In Pneumatics And How They Are Different Than The Hydraulics.					
		2.4	Trace The Simple Pneumatic Circuits					
		2.5	Detect And Rectify Common Faults In Pneumatic Circuits.					
		2.6	Demonstrate The Ability To Clean Compressed Air Filters Including Dryers (Dehumidifier) (Group Activity Of 2-3 Cadets)					
		2.7	Demonstrate The Ability To Overhaul The Pneumatic Tools / Equipment Such As Pneumatic Torque Wrench (Group Activity Of 4-5 Cadets)					

Detailed Teaching Syllabus

Subject code	UD11P5103	Block 1	Hydraulics	Block 4	Electrical shop
Subject name	Workshop Practices	Block 2	Pneumatics	Block 5	Carpentry shop
		Block 3	Fitting Shop		

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Fitting Workshop	Fitting Workshop	3.1	Demonstrate The Ability To Perform At Least Four Basic Fitting Jobs Of Given Dimension By Using Proper Hand Tools Such As Files, Hacksaw, Chisel, Hammer, Etc. (Group Activity Of 2-3 Cadets). Safety precautions.			4		
		3.2	Demonstrate The Use Of Feeler Gauge, Thread Gauge, Screw Gauge, Vernier Calliper, On The Above Said Job.					
		3.3	Identify Various Spanners, Nuts And Bolts, Allen Screws, Studs And Demonstrates Their Use.					
		3.4	Demonstrate The Use Of Grinding Machine Including Portable Grinders And Drilling Machine On The Above Said Job. Safety precautions.					
Electrical Shop	Electrical Shop	4.1	Identify Electrical Insulated Hand Tools.			7	NAVIGATION LIGHT ALARM	
		4.2	Demonstrate The Ability To Identify Electrical Conductors (Wires And Cables).					
		4.3	Identify The Electrical Accessories Such As Fuse, Circuit Breakers, Choke, Starters, Etc. And Demonstrates The Use Of It In Electrical Circuits.					
		4.4	Assemble A Tube Light Fitting By Using Tube Fittings And Test It.					
		4.5	Demonstrate The Ability To Carry Out Battery Check And Maintenance - Voltage, Acid Density And Battery Capacity By Continuous Current Drain (Group Activity Of 2-3 Cadets). Safety precautions.					
		4.6	Identifies Safety Precautions To Take To Avoid Shock And To Rescue A Person From Electrical Shock Location.(Instructor Demonstration For A Group Of 5 Cadets).					
		4.7	Demonstrate The Use Of Relay In Electrical/ Electronic Circuits.					
Carpentry Shop	Carpentry Shop	5.1	Identify Carpentry Hand Tools Such As Chisel, Jack Plane, Augur, Mortise Gauge, Etc. Safety precautions.			12		
		5.2	Identify Various Wood For Specific Purposes Treatment Materials.					
		5.3	Identify Various Wood Jointing Material Using Adhesive, Nails, Screws Etc.					
		5.4	Demonstrate The Ability To Execute Wood Jointing (Group Activity Of 2-3 Cadets)					
		5.5	Demonstrate The Ability To Make A Cement Box; Wooden Box As Per Drawing By Using Appropriate Tools, Wood Jointing Method And Wood Jointing Material / Adhesives (Group Activity Of 4-5 Cadets)					
		5.6	Use Clamps/ Cement Box To Arrest A Leak. (Instructor Demonstration For Group Of 20 Cadets)					
		5.7	Use Of Fibre Glass Repair Kits. (Instructor Demonstration For Group Of 20 Cadets)					
						37	Total 37 Hrs	

Detailed Teaching Syllabus

Subject code	UD11P5104	Block 1 Seamanship
Subject name	Seamanship Lab	

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Seamanship	Hold Monitoring	1.1	Demonstrate Taking Soundings And Ullage.			30		
		1.2	Demonstrate Taking Hold Temperature.					
	Draft Reading	1.3	Conduct Practical Exercises In Reading Draft Marks.					
	Ropework	2.1	Identify Between Right Hand Lay And Left Hand Lay Ropes					
		2.2	Demonstrate And Conduct Practice On Various Types Of Whippings.					
		2.3	Demonstrate And Conduct Practice On Various Types Of Knots, Bends And Hitches. Practical Usage Of Knots And Understanding Where Each Knot Is Used.					
	Mooring Stations	3.1	Demonstrate The Method Of Connecting A Heaving Line / Messenger Line To A Hawser.					
		3.2	Demonstrate The Method Of Belaying And Racking A Wire Rope.					
		3.3	Conduct Practical Exercises On Throwing Heaving Lines, Use Of Rope And Chain Stoppers, Mooring Shackle And Safe Handling Of Mooring Ropes. Use Of Slip-Ropes. Use Of Fenders, Messenger Line.					
		3.4	Demonstrate The Method Of Joining Two Mooring Lines.					
	Seamanship Practices	4.1	Demonstrate The Method Of Securing Oil Drums, And Other Loose Gear.					
		4.2	Demonstrate The Method Of Belaying Rope To Cleats And Stag Horn.					
		4.3	Demonstrate The Use Of Various Power Tools Such As Pneumatic/ Electrical Chipping And De-Scaling Tools And Precautions Needed.					
		4.4	Demonstrate Hazards Associated With The Use Of Portable Ladders Onboard.					
		4.5	Demonstrate Understanding Of Different Manual Lifting Techniques For Heavy Weights					
	Blocks & Tackles	5.1	Conduct Practical Exercise On The Use Of Blocks, Snatch Blocks And The Differential Pulley (Chain Blocks).					
		5.2	Conduct Practical Exercises On The Use And Maintenance Of Various Types Of Blocks, Tackles, Shackles And Bottle Screws / Turnbuckles, Including Opening, Greasing, (Group Activity Of 2-3 Cadets)					
		5.3	Demonstrate The Use Of Container Lashing Gear. (Group Activity Of 2-3 Cadets)					
	Pilot Ladder	6.1	Learn And Demonstrate How A 'Pilot Ladder' Can Be Rigged Up According To The Relevant Rule Requirements					
		6.2	Demonstrate How To Climb Up A 'Pilot Ladder' After Taking All Due Safety Precautions					
						44	Total 44 Hrs	

SEMESTER-I
Question Paper
Templates

INDIAN MARITIME UNIVERSITY
(A Central University Government of India)
Diploma in Nautical Science
Semester I

APPLIED MATHEMATICS
Subject Code: UD11T5101

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Use of Non-programmable Scientific Calculator is permitted

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Spherical Trigonometry (Oblique Triangle)
 - b) Vector Algebra, Graphs: Addition/ Subtraction of vectors
4. (2 x 5 = 10 Marks)
- a) Spherical Trigonometry (Right Angle or Quadrantal Triangle)
 - b) Problems involving Force; Solution of 'Simultaneous Equations' using graphs
5. (2 x 5 = 10 Marks)
- a) Spherical Trigonometry (Right Angle or Quadrantal or Polar Triangle)
 - b) Co-ordinate Geometry

Note : Q4a & Q5a should be of different type

6. (2 x 5 = 10 Marks)
- a) Mensuration And Geometry
 - b) Plane Trigonometry

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Semester I

7. (2 x 5 = 10 Marks)
- a) Proportion, Variation And Interpolation
 - b) Plane Trigonometry (different from 6b)
8. (2 x 5 = 10 Marks)
- a) Vector Algebra, Graphs: Multiplication of Vectors by Scalars
 - b) Problems involving Velocity/Acceleration; Solution of 'Simultaneous Equations' using graphs
9. (2 x 5 = 10 Marks)
- a) Mensuration And Geometry (different from 9a)
 - b) Proportion, Variation And Interpolation

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

APPLIED SCIENCES
Subject Code: UD11T5102

Max. Marks: 70

Pass Marks: 35 Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Use of Non-programmable Scientific Calculator is permitted

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
 - a) Theory [Topic: Mechanics]
 - b) Numerical [Topic: Current electricity]
4. (2 x 5 = 10 Marks)
 - a) Numerical [Topic: Mechanics]
 - b) Theory [Current and static electricity]
5. (2 x 5 = 10 Marks)
 - a) Theory [Topic: Heat]
 - b) Theory [Topic: Current Electricity & its effects]
6. (2 x 5 = 10 Marks)
 - a) Numerical [Topic: Oscillations]
 - b) Theory [Topic: Current Electricity & its effects]

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Semester I

7. (2 x 5 = 10 Marks)
a) Theory [Sound]
b) Numerical [Topic: Sound]
8. (2 x 5 = 10 Marks)
a) Theory [Topic: Light]
b) Theory [Topic: Transmitters]
9. (2 x 5 = 10 Marks)
a) Numerical [Topic: Light]
b) Theory [Topic: Transmitters]

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

Ship Construction and Stability - I
Subject Code: UD11T5103

Max. Marks: 70

Date :

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Pass Marks: 35

Time: 2 hours

Use of Non-programmable Scientific Calculator is permitted

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1.1 (Const)
 - b) Numerical Unit 4.11 to 4.20 (Stab)
4. (2 x 5 = 10 Marks)
- a) Unit 1.3 (Const)
 - b) Theory Unit 3 (Stab)
5. (2 x 5 = 10 Marks)
- a) Unit 1.4 (Const)
 - b) Numerical Unit 4.3 (Stab)
6. (2 x 5 = 10 Marks)
- a) Unit 2.2 / Unit 2.3 (Const)
 - b) Numerical Unit 4.6 (Stab)

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Semester I

7. (2 x 5 = 10 Marks)
- a) Numerical Unit 3.1.15 (Stab)
 - b) Unit 1.2 / 2.4 (Const)
8. (2 x 5 = 10 Marks)
- a) Numerical Unit 3.6 (Stab)
 - b) Numerical Unit 3.1.16 (Stab)
9. (2 x 5 = 10 Marks)
- a) Numerical Unit 3.15 – 3.17 (Stab)
 - b) Theory Unit 4 (Stab)

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

Navigation I : Navigation & Chartwork
Subject Code: UD11T5104

Max. Marks: 70

Pass Marks: 35

Date :

Time: 3 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Use BA Chart 813 (South Coast of Sri Lanka) for Chart work

Use of Selected pages of Nautical Almanac 2008, Norie's Tables and Non-programmable type Scientific Calculator is allowed in the Exam Hall.

Draw Sketches wherever required.

Section - A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Numerical Unit 2.03
 - b) Unit 6.05
4. (2 x 5 = 10 Marks)
- a) Numerical Unit 2.04
 - b) Theory Unit 10.08
5. (2 x 5 = 10 Marks)
- a) Numerical Unit 3.04
 - b) Unit 10.06 – 10.07

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Semester I

6. (2 x 5 = 10 Marks)
a) Numerical Unit 5.05 - 5.08
b) Unit 6.02 – 6.03
7. (2 x 5 = 10 Marks)
a) Numerical Unit 8.02 – 8.05
b) Unit 1.01 – 1.06
8. Numerical Unit 8.06 - 8.07 (10 Marks)
9. Numerical Unit 9.05 (10 Marks)

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

Navigation – II: Bridge Equipment, Watchkeeping & Meteorology
Subject Code: UD11T5105

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Section - A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 4.1 – 4.2
 - b) Unit 2
4. (2 x 5 = 10 Marks)
- a) Unit 4.3 – 4.4
 - b) Unit 2
5. (2 x 5 = 10 Marks)
- a) Unit 4.5 – 4.6
 - b) Unit 2

Note : Different topics to be covered under Q3b, Q4b & Q5b

6. (2 x 5 = 10 Marks)
- a) Unit 4.7 – 4.8
 - b) Unit 1.1 – 1.2

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Semester I

7. (2 x 5 = 10 Marks)
a) Unit 4.9 – 4.10
b) Unit 1.3 to 1.4.4
8. (2 x 5 = 10 Marks)
a) Unit 1.5 – 1.6
b) Unit 1.7 - 1.8
9. (2 x 5 = 10 Marks)
a) Unit 1.9 or Unit 2.20 or Unit 2.21
b) Unit 3

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

Cargo Handling, Stowage and Seamanship I
Subject Code: UD11T5106

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Section - A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1
 - b) Unit 5
4. (2 x 5 = 10 Marks)
- a) Unit 2.1 to 2.6, 2.13 (Numerical)
 - b) Unit 6
5. (2 x 5 = 10 Marks)
- a) Unit 2.13 (Numerical)
 - b) Unit 6 (different topic from 4b)
6. (2 x 5 = 10 Marks)
- a) Unit 2 Theory
 - b) Unit 7

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Semester I

7. (2 x 5 = 10 Marks)
- a) Unit 3
 - b) Unit 6.1, 6.2 (Numerical)
8. (2 x 5 = 10 Marks)
- a) Unit 3 (different topic from 7a)
 - b) Unit 8
9. (2 x 5 = 10 Marks)
- a) Unit 4
 - b) Unit 8 (different topic from 8b)

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

English and Human Factors
Subject Code: UD11T5107

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. Unit 3 / Reading Comprehension passage & Q.A. (Random) (10 Marks)
4. (2 x 5 = 10 Marks)
 - a) Unit 4 / Writing skills
 - b) Unit 5.3 / Human Factors (application of soft skills)
5. (7 marks)
 - a) Unit 1/Communication
 - b) Unit 2 (SMCP) (3 marks)
6. (7 marks)
 - a) Letter/email/report writing from Unit 4/Writing skills- Application
 - b) Unit 2 (SMCP) (3 marks)
7. (2 x 5 = 10 Marks)
 - a) Grammar passage correction Unit 3.2/Grammar
 - b) Unit 5 / Human Factors

INDIAN MARITIME UNIVERSITY
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Diploma in Nautical Science
Semester I

- | | | |
|----|--|------------|
| 8. | Unit 4 / Writing skills | (10 Marks) |
| 9. | Unit 3.1 / Questions from Prescribed Text book | (10 Marks) |

-----End of question paper-----

I
M
U

SEMESTER-II

Course Curriculum for One year Diploma in Nautical Science (DNS) leading to B.Sc. (Applied Nautical Science) Degree

Credit System

The University follows the "Credit System" for its programmes. Each credit in the DNS Nautical Science program is equivalent to 15 hours of study comprising all learning activities which include reading and comprehension, listening to audio, watching videos, attending counseling sessions, teleconferencing, and writing assignment responses. Thus, a four credit course involves 60 study hours. This helps the student to understand the academic efforts one has to put in, in order to successfully complete a course. Completion of an academic programme requires successful clearing of both the assignments and the term end examination of each course in the programme. The course outline and timetable provide guidance on the time allocation for the course material, but the faculty teaching the subject is free to make adjustments as necessary.

Second six months

Subject Code	Subject Name	Teacher Assessment Marks (Attendance, Discipline, Journals, Assignment, Lab works)	Class Test Marks (objective & or written & or oral & or quiz)	Internal Marks	University Examination	Pass Marks (University Examination)	Total Marks (Final)	Total Marks (Passing %)	Lecture Per Week	Practical Per Week	Total Study Hours per week/per Six months	Credits
UD11T5201	Navigation III: Navigation & Chartwork	10	20	30	70	35 / 70	100	50	7	NA	7/87	6
UD11T5202	Navigation IV: Advanced Bridge Equip, W/keeping and Meteorology	10	20	30	70	35 / 70	100	50	5	NA	5/67	5
UD11T5203	Cargo Handling, Stowage & Seamanship II	10	20	30	70	35 / 70	100	50	5	NA	5/70	5
UD11T5204	Ship Construction & Ship Stability - II	10	20	30	70	35 / 70	100	50	5	NA	5/74	5
UD11T5205	MARPOL & Marine Engineering Knowledge	10	20	30	70	35 / 70	100	50	4	NA	4/52	3
UD11T5206	Emergencies, Maritime Communication & Commercial Shipping Knowledge	10	20	30	70	35 / 70	100	50	4	NA	4/46	3
UD11P5201	Communicative English Lab	10	40	50	50	25 / 50	100	50	NA	1	1/18	1
UD11P5202	Workshop Practices & S'Ship	10	40	50	50	25 / 50	100	50	NA	5	5/67	4
UD11P5203	Navigation Laboratory	10	40	50	50	25 / 50	100	50	NA	2	2/30	2
	Totals	90	240	330	570		900				38/511	34

DNS SEM I – 1100 marks + SEM II – 900 marks = 2000 marks

Detailed Teaching Syllabus

Subject code	UD11T5201	Block 1 Navigation
Subject name	Nav III: Navigation & Chartwork	Block 2 Chartwork

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Navigation	Solar System	1.01	Describe The Composition And Dimensions Of The Solar System (Sun, Planets, Earth & Moon, Asteroids, Astronomical Unit for measuring distances from Sun)	U	6	2		R12, R13, R16, R17, R27
		1.02	Describe The Inclination Of The Earth's Axis To The Plane Of The Orbit And The Stability Of The Axis (Ignoring Precession) And Shows How It Causes The Seasons.	U				
		1.03	Explain The Concept Of The Earth's Axial Rotation Giving Day And Night.	U				
		1.04	Explain Daylight And Darkness Conditions In Various Latitudes At The Solstices And Equinoxes.	U				
		1.05	Use The Information In The Nautical Almanac To Obtain The Time Of The Meridian Passage Of Sun To The Nearest Minute, Allowing For The Observer's Longitude When Necessary.	A				
	Principles of Navigation	2.01	Explain The Following:	U	7	8		R12, R13, R27, R30, R40
		2.01.1	. Time And Hour Angle, Greenwich Time, Local Time, Zone Time And Standard Time. Keeping Time At Sea, Advancing And Retarding Of Clocks With Change Of Longitude, International Date Line.	U				
		2.01.2	. Explain The Equinoctial As A Fixed Reference Plane And The Direction Of The First Point Of Aries As A Reference.	U				
		2.01.3	. Describe The Equinoctial System Of Co-Ordinates.	U				
		2.01.4	. Define 'Greenwich Hour Angle (GHA)', 'Local Hour Angle (LHA)' And Longitude, And Explain Their Relationship.	U				
		2.01.5	. Define Sidereal Hour Angle, Declination, Polar Distance And Right Ascension.	U				
		2.01.6	. Explain The Concept Of The Earth's Axial Rotation Causing Change In The Hour Angle Of Bodies.	U				
		2.01.7	. Describe The Information Contained In General In The Nautical Almanac (Na) And In Detail In The Daily Pages.	U				
		2.01.8	. Use The Tables Of Corrections And Incremental Corrections In The Nautical Almanac.	U				
		2.01.9	. Explain The Importance Of The First Point Of Aries And Define Sha Of Stars.	U				
		2.01.10	Find The LHA Of Aries, Given The Date, GMT And Longitude Of The Observer.	A				
		2.01.11	Find The LHA Of A Body, Given The Date, GMT And Longitude Of The Observer.	A				
		2.01.12	Derive The LHA Of A Star Given The Date, GMT And Longitude Of The Observer.	A				
2.01.13	Determine The Geographical Position Of A Body For Any Given GMT.	A						

Detailed Teaching Syllabus

Subject code	UD11T5201	Block 1 Navigation
Subject name	Nav III: Navigation & Chartwork	Block 2 Chartwork

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Navigation	Principles of Navigation	2.01.14	Define 'Rational Horizon', 'Zenith' And 'Nadir'.	K				R2, R12, R13, R16, R17, R25, R28, R31, R36, R40	
		2.01.15	Define 'Vertical Circle' And 'Prime Vertical Circle'.	K					
		2.01.16	Define 'Elevated Pole' And 'Depressed Pole'.	K					
		2.01.17	Define The Observer's Upper And Lower Celestial Meridian.	K					
		2.01.18	Define 'True Altitude', 'Azimuth' And 'True Zenith Distance'.	K					
		2.01.19	Explain The Relationship Between Azimuth, Quadrantal Bearings And 360° Notation Bearing.	U					
		2.01.20	Recognize Rising And Setting Points.	K					
		2.01.21	Recognize The Parts Of The PZX Triangle.	K					
		2.01.22	Draw Figures On The Plane Of The Rational Horizon.	A					
		2.01.23	Calculate Lmt Sunrise And Sunset On A Given Day For An Observer At A Given Position.						
		2.01.24	Define 'Amplitude' And Its Relationship With Rising/ Setting Bearing Of A Heavenly Body.						
		2.01.25	Derive The Formula For Amplitude, Given Observer's Latitude And Declination Of Body.						
		2.01.26	Solve Problems Involving Calculation Of Compass Error Where Rising/Setting Bearings Of Heavenly Bodies On A Given Date Are Given.						
		2.01.27	Describe The Use Of ABC Tables To Calculate Azimuth.						
	2.01.28	Solve Problems Involving Calculation Of Compass Error Using Azimuth Method.							
	Position Fixing (LbM Alt) (Long by Chron)	3.01	Latitude By Meridian Altitude (Sun)	A	5	5			
		3.01.1	Describe The Relationship Between The Altitude Of The Elevated Pole And The Latitude Of The Observer						
		3.01.2	Find Meridian Zenith Distance From True Altitude						
		3.01.3	Apply Meridian Zenith Distance To Declination To Get Latitude Of The Observer						
		3.01.4	Find The Value Of The Polar Distance Of The Body, Using Its Declination						
		3.01.5	Draw The Direction Of The Position Line Through The Observer When Taking A Meridian Altitude						
		3.02	Position Fixing (Sun)	A					
		3.02.1	Describe The Significance Of Long By Chron Method Of Sights.						
		3.02.2	Determine The Directions Of A Position Line Through An Observer And A Position Through Which It Passes.						
		3.02.3	Solve The Pzx Triangle To Find The Angle P (hour angle inside the PZX Triangle), by LBC formula						

Detailed Teaching Syllabus

Subject code	UD11T5201	Block 1 Navigation
Subject name		Block 2 Chartwork
Nav III: Navigation & Chartwork		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Chart Work		4.17	Define 'Set', 'Rate', 'Drift' And 'Leeway' Due To Wind.	K					
		4.18	Define 'Ship's Speed', 'Effective Speed', 'Course And Distance Made Good' And Applied Leeway.	K					
		4.19	Find The Course And Distance Made Good With A Tidal Stream Or Current. Find ETAs at desired bearings from a Lighthouse	A					
		4.20	Find The Course To Steer Allowing For Tidal Stream Or Current. Find ETAs at desired bearings from a Lighthouse	A					
		4.21	Find The Set Rate Of Tidal Stream Or Current From Charts Or Tables.	A					
		4.22	Determine Ship's Position By The Running Fix (ONLY WITH BEARINGS), With And Without Current	A					
		4.23	Calculate The Actual Set And Drift Of Tidal Stream Or Current Comparing Dr And Fixed Positions.	A					
		4.24	Use Gnomonic Charts For Planning Great Circle And Composite Sailings.	A					
		4.25	Checks That The Chart Is Corrected Up To Latest Notice To Mariners.	A					
	Tides		5.01	Describe The Basic Theory Of Tides.	U	4	4		R14, R15, R18, R32, R35
			5.02	Define 'Spring Tide', 'Neap Tide', 'Height Of Tide', 'High Water' And 'Low Water', 'Mean High Water Springs', 'Mean High Neaps', 'Mean Low Water Springs', 'Mean Low Water Neaps', 'Range', 'Chart Datum'.	K				
			5.03	Explain That The Spring And Neap Ranges For Standard Ports Are Different.	U				
			5.04	Find The Predicted Time And Height Of High And Low Water At Standard Ports.	A				
			5.05	Explain The Formation Of The Tidal Stream And Its Effect On Normal Navigation Of A Ship. Explain The Use Of Tidal Stream Atlas.	U				
	Electronic Chart Display & Information System (ECDIS)		6.01	State ECDIS compliance requirements wrt following -	K	14 L	0		R37, R38, R39
			6.01.1	. Back-up for ECDIS on board (2nd ECDIS or Paper chart folio)	K				
			6.01.2	. Back up for ENC (RNC with corresponding Paper chart in use for primary navigation)	K				
			6.01.3	. Mandatory sensors for ECDIS	K				
			6.01.4	. Use of approved & updated hardware/software complying with latest applicable IHO standards	K				
			6.01.5	. Use of official chart service, weekly updating of ENCs	K				
			6.01.6	. Training & Certification of Officers	K				
			6.02	Briefly state the purpose of following key regulations governing various aspects of ECDIS (maximum 5 lines on each) -	K				
			6.02.1	. Ecdis Performance Standards MSC232(82)	K				
			6.02.2	. IHO Standards S57, S52, S63 only	K				

Detailed Teaching Syllabus

Subject code	UD11T5201	Block 1 Navigation
Subject name		Nav III: Navigation & Chartwork
		Block 2 Chartwork

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Chart Work	(ECDIS)	6.02.3	. IEC61174	K				R37, R38, R39
		6.03	Compare ENC with Paper chart and list key differences. State that ENC has a 3D structure (multi layered) and user can choose to display or hide some layers. State that ENC is considered Intelligent chart as information is digitally stored and can be interrogated as against Paper or Raster chart which are just images & cannot be interrogated	U				
		6.03.1	State that ENC is a database in S-57 format. State how is ENC named (explanation of 8 character name of an ENC)	K				
		6.03.2	State that ECDIS transforms ENC into a SENC format before the Presentation of Data on display. State that SENC is also a reorganized Database (which is system specific)	U				
		6.03.3	List 6 Usage scales (bands) in navigational charts & explain the purpose of each scale (Overview, General, Coastal, Approach, Harbour, Berth)	U				
		6.04.1	State that ENC has 3 types of Objects (point objects, line objects, area objects) and give one example of each type.	U				
		6.04.2	State that various Attributes may be assigned to ENC objects by the NHOs, which have an impact on how Data is presented. Explain following attributes - DATSTA, DATEND, SCAMIN	U				
		6.05.1	Explain the modes of display – Base, Standard & ALL [as given in MSC 232(82)]	U				
		6.05.2	States that even in ALL display mode only a small part of information contained in the ENC is displayed. States that all other information which is not displayed even in ALL display mode can be accessed by a Pick-report function.	K				
		6.06	States what is meant by term 'Quality of Data (CATZOC)' on an ENC. Understand CATZOC categories – A1, A2, B, C, D, U. State the depth accuracy & position accuracy associated with each CATZOC value.	U				
		6.07	Explain the significance of following safety settings - Safety Depth & Safety Contour. State that these settings have to be updated whenever ships draft changes. State the impact on ENC display when these settings are changed	U				
		6.08	Understands & states following aspects of Route planning and monitoring –	U				
		6.08.1	. States that route has to be created from berth to berth on ENC and checked for safety before executing voyage.	K				
		6.08.2	. States that route settings such as XTD (P & S), Rate of turn, Radius of turn, Leg-speed has to be checked for each leg of the voyage and appropriate value set for each leg.	K				

Detailed Teaching Syllabus

Subject code	UD11T5201	Block 1 Navigation
Subject name		Nav III: Navigation & Chartwork

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Chart Work	(ECDIS)	6.08.3	. States that safety settings such as safety contour & safety depth shall be determined for all legs of the route and set accordingly before executing voyage (route leg)	K				R37, R38, R39
		6.08.4	. States that Route alarm settings have to be checked before executing voyage	K				
		6.08.5	. States that user has to mark the voyage ENC's in the same way as was done on paper charts, by making use of ECDIS feature - User-layers and user-objects) (Examples of marking ENC's - manual position plotting, NoGo areas, Contingency anchorages, Abort points, Call Master points, Clearing bearings or ranges, Parallel Index lines, etc)	K				
					48	39	Total 87 Hrs	

Methodology and Reference Books

Subject Code

UD11T5201Subject Name **Navigation III: Navigation & Chartwork**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Admiralty Manual of Navigation (Vol. I, II & III)	R16	Principles of Navigation - by Capt. P.M. Sarma
R2	Star Finder and Identifier	R17	Nautical Almanac
R3	STCW'95 Convention	R18	Tide Tables
R4	Symbols and Abbreviations on Admiralty Charts (INT 5011)	R19	Admiralty Ocean Passages for the World
R5	Indian and Admiralty Chart Catalogue	R20	Mariner's Hand Book- by HMSO Publication
R6	Notice to Mariners	R21	Cumulative List of Admiralty Notices to Mariners - by Hydrographic Office
R7	Maritime Buoyage System (I.A.L.A)	R22	Admiralty Sailing Directions
R8	Modern Chartwork - by Squair	R23	International Code of Signals
R9	Voyage Planning & Chartwork - by Capt. M.V. Naik and Capt. Varty	R24	International Aeronautical and Maritime Search and Rescue Manual : Vol. 3 - by I.M.O
R10	Marine Chartwork - by Moore D.A.	R25	Norie's Nautical Tables
R11	Company Forms for Voyage Planning	R26	Passage Planning Guide Malacca & Singapore Straits
R12	Principles of Navigation - by Capt. T.K. Joseph & Capt. S.S.S. Rewari	R27	The Admiralty Manual of Navigation : Principles of Navigation : Vol. 1 - by Nautical Institute
R13	Practical Navigation - by Capt. H. Subramaniam	R28	The Admiralty Manual of Navigation : Astro Navigation Vol. 2 - by Nautical Institute
R14	Chart Work - by Capt. S.S. Chaudhari	R29	From Paper Charts to ECDIS : A Practical Voyage Plan - by Harry Gale
R15	Chart Work for Mariners - by Capt. S.K. Puri	R30	Nicholls's Concise Guide to the Navigation Examinations Vol. 2 - by Edward J Coolen

Methodology and Reference Books

Subject Code

UD11T5201

Subject Name **Navigation III: Navigation & Chartwork**

R31	Navigation Guide Vol. 2 : Celestial Navigation - by Alexander Simpson	R37	IMO 1.27 (ECDIS Model Course)
R32	Navigation for Masters - by House, D.J.	R38	MSC 232(82), ECDIS Performance Standards
R33	Practical Navigation for Officers of the Watch - by Frost, A.	R39	ECDIS BLUES by Capt Vincent Fernandes
R34	Passage Planning Guidelines - by Salmon D.R.	R40	American Practical Navigator
R35	Nav Basics : The Earth, The Sailings, Tides & Passage Planning Vol.1 - by Witherby Seamanship International Ltd.	R41	Symbols and Abbreviations on Admiralty Charts (INT 5011)
R36	Nav Basics : Ocean Offshore and Celestial Navigation Vol.2 - by Witherby Seamanship International Ltd.	R42	Symbols and Abbreviations on ENC's (INT 5012)

Detailed Teaching Syllabus

Subject code	UD11T5202	Block 1 Advanced Bridge Equipment & Watchkeeping
Subject name	Nav IV: Adv Bridge Equipment, Watch-keeping and Meteorology	Block 2 Meteorology

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Adv Bridge Equipment & Watch Keeping	(Radar)	1.1	Explain The Basic Working Of Marine Radar With The Block Diagram. List The Controls Of The Radar And Explain The Effect Of Weather And Limitations Of The Radar. Draw Oaw Triangle. Radar Plotting Numericals Related To Calculation Of TCPA, CPA, Target Course & Speed & Aspect In Relative Motion Involving Single Target.	K/U/A	12	5	USE OF SIMULATOR, AND SHIP VISITS WHERE PRACTICALLY FEASIBLE FOR COVERING THIS TOPIC IS RECOMMENDED	R12, R14,R19, R20, R27, R34, R35, R41, R42, R46, R52
		(GPS, GNSS)	1.2	Explain "Global Navigation Satellite Systems" (GNSS)	U			
	1.2.1	As A System Of Position Fixing Using Earth- Orbiting Satellites That Broadcast Their Locations To Receiver Units Which In Turn Calculate The Ground Position Based On That						
	1.2.2	State That Presently Fully Operational Gnss Systems Are The United States' Global Positioning System (GPS) And The Russian Federation's Global Navigation Satellite System GLONASS)						
	1.2.3	State That World-Wide GNSS Systems Which Are Under Development Are -						
	1.2.3.1	Galileo System - Operated By The European Union						
	1.2.3.2	Beidou Navigation Satellite System (BDS) - Operated By China						
	1.2.3.3	Indian Regional Navigation Satellite System (IRNSS) : NAVIC - Operated By India						
	1.2.3.4	Quasi-Zenith Satellite System (QZSS) -Operated By Japan						
	1.2.4	State That Differential Gps (DGPS) System Uses A Technique To Improve Positional Accuracy By Determining And Transmitting Error At A Known Location To All Other Users Operating In The Vicinity.						
	1.2.5	Describe World Geodetic System 1984 (WGS 84) as a -						
	1.2.5.1	Terrestrial Reference System (Geodetic Datum) Which Is The Used By The GPS Satellites For Position Fixing Explain The Basic Working Principle Of GPS, Its Limitations & Alarm Settings						
	(AIS)	1.3.1	State That 'Automatic Identification System (AIS) Is A Mandatory Equipment Fitted On Ships And Shore- Stations, Purpose Of Which Is To Enhance Maritime Safety, Security And Protection Of The Marine Environment Through Automated Exchange Of Information.	K				
	1.3.2	State That, AIS Through Its Automatic Exchange Of Data (Ship-To-Ship And With Shore-Based Stations), Helps To Identify And Track Vessels; Exchange Mandory Information (Ship Reporting Function) And Provide Additional Information To Watch Keeper To Improve His Situational Awareness						
	1.3.3	List Out The Information Which Will Be Part Of Standard Form At Transmitted By An AIS Transponder Fitted On A Ship List The Information As Provided By An AIS Including 'Static Data', Dynamic Data', Voyage Related Data' And 'Safety Related Data'						

Detailed Teaching Syllabus

Subject code	UD11T5202	Block 1 Advanced Bridge Equipment & Watchkeeping
Subject name	Nav IV: Adv Bridge Equipment, Watch-keeping and Meteorology	Block 2 Meteorology

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Adv Bridge Equipment & Watch Keeping	(LRIT)	1.3.4	List The Limitations Of Using AIS For Collision Avoidance Situations					
		1.3.5	State That Reporting Intervals Of 'Dynamic Data' Will Depend Upon The Speed And Course Alteration Of The Vessel.					
		1.4	State The Concept And Purpose Of LRIT, VDR/ S-VDR, And BNWAS	U				
		1.4.1	Describe The Purpose Of Fitting A "Long Range Identification And Tracking" Device (LRIT) On Board A Ship List Out The Data Which Will Be Transmitted As Part Of LRIT Transmission From A Ship					
		1.4.2	Describe The Purpose Of Fitting A "Voyage Data Recorder" (VDR) On Board A Ship List Out The Data Which Will Be Recorded Automatically By A VDR Unit Fitted On A Ship					
		1.4.3	Describe A "Bridge Navigation And Watch Alarm System" (BNWAS) And Its Use					
		1.4.3.1	Describe The Stages And Alerting Sequences Of A BNWAS Unit.					
	Bridge Team Work & Management (BTM/BRM)	2.1	Describe The Basic Principles Of Bridge Teamwork And Bridge Resource Management. Describe The Organizational Structure Of The Bridge Team. Explain The Duties Of Master, Oow, Helmsman, Lookout And Pilot.	U	7	5	USE OF DECK LOG BOOK, MOVEMENT BOOK, WEATHER LOG BOOK, BEAUFORT SCALE CHART, SHIPS WEATHER CODE IS RECOMMENDED.	R1, R5, R10, R28
		2.2	State That Bridge (Marine) Resource Management (BRM) Is The Effective Use Of The Bridge Team And The Creation Of An Environment Where "One Person Error" Is Eliminated.					
		2.3	Explain Importance Of Maintaining Situational Awareness At All Times: Allocation, Assignment, And Prioritization Of Resources, Effective Communication Assertiveness And Leadership Obtaining And Maintaining Situational Awareness Consideration Of Team Experience.					
		2.4	Record All Information Including Meteorological Data In Bridge Logs Such As Movement (Bell) Book, Deck Log Book, GPS Log, Echo Sounder Log, Radar Log, Compass Error Log.	A				
		2.5	State That Responsibility For The Safety Is Clearly Defined At All Times, Including Periods When The Master Is On The Bridge And While Under Pilotage.	K				
	Watch-Keeping Principles And Duties	3.1	State The Circumstances Under Which The Master Should Be Called.	K	8		USE OF COPIES OF THE DECK LOG BOOK, OFFICIAL LOG BOOK, OIL RECORD BOOK, GARBAGE LOG BOOK, BALLAST RECORD BOOK IS RECOMMENDED	R1, R3, R5, R17, R21, R25, R30, R31, R32, R33, R36, R37, R38, R39, R43, R44, R45, R47, R51

Detailed Teaching Syllabus

Subject code	UD11T5202	Block 1 Advanced Bridge Equipment & Watchkeeping
Subject name	Nav IV: Adv Bridge Equipment, Watch-keeping and Meteorology	Block 2 Meteorology

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES			
Adv Bridge Equipment & Watch Keeping		3.2	Explain Briefly The Contents And State The Importance Of Recording All Relevant Information In The Following Log Books: Deck Log Book, Bridge Equipment Logs, Movement Log, And Communications Log.	U			PRE-ARRIVAL/ PRE-DEPARTURE CHECKLISTS BRIDGE PROCEDURES GUIDELINES				
		3.3	Explain The Preparations Involved And Duties Prior To Arrival Port. (From The Deck Officers Perspective)	U							
		3.4	Describes The Basic Principles To Be Observed In Keeping A Navigational Watch As Set Out In Section A-Viii/2 And B- Viii/2 Of The Stcw 2010 Convention And The Bridge Procedures Guide Regarding The Following:	U							
		3.4.1	Look-Out								
		3.4.2	Watch Arrangements (Manning Levels)								
		3.4.3	Taking / Handing Over The Watch								
		3.4.4	Performing The Navigational Watch								
		3.4.5	Watchkeeping Under Different Conditions And In Different Areas (Clear Weather, Restricted Visibility, Hours Of Darkness, Coastal And Congested Waters, Navigation With Pilot On Board, At Anchor)								
		3.5	explain The Watch Keeping Duties At Anchor And At Sea	U							
		3.6	Explain The Duties And Procedures Associated With Preparing The Vessels To Proceed To Sea From Bridge Watch Keeper's Perspective (Departure Checklist Including Testing Of Steering Gear As Per Solas	U							
		3.7	Explain Various Ship Reporting Systems. (Explain Their Purpose And Importance, State That Some Are Mandatory While Some May Be Voluntary. LIST names of some International Reporting Systems - Amver, Inspires, Indsar, Ausrep, Jasrep, Straitrep(Singapore), Wetrep(West European Tanker Reporting System), Reefrep(Australia)	U							
		Collision Regulations	4.1	Refresher Training For Colregs Rules As Covered In Semester I Navigation II	U	5				REFERENCE TO RELEVANT CASE STUDIES OF ACCIDENTS IS RECOMMENDED	R3, R5, R7, R53
			4.2	Explain That A Potential Collision Situation May Be Divided Into The Following Four Stages -	U						
			4.2.1	At Long Range, Before Risk Of Collision Exists And Both Vessels Are Free To Take Any Action							
			4.2.2	Risk Of Collision Applies, The Give Way Vessel Is Required To Take Action And The Other Vessel Must Keep Her Course And Speed							
4.2.3	The Give Way Vessel Is Not Taking Appropriate Action										
4.2.4	Collision Cannot Be Avoided By Action Of A Give Way Vessel Alone										
4.3	Describes And Cite Examples Of Precautions Which May Be Required By The Ordinary Practice Of Seaman Or By Special Circumstance Of The Case		U								

Detailed Teaching Syllabus

Subject code	UD11T5202	Block 1 Advanced Bridge Equipment & Watchkeeping
Subject name	Nav IV: Adv Bridge Equipment, Watch-keeping and Meteorology	Block 2 Meteorology

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Adv Bridge Equipment & Watch Keeping		4.4	Give Examples Of Circumstances, Which May Make A Departure From The Rules Necessary. Use of VHF in Collision Avoidance (Cautions)	U				
	Conduct Of Vessels In Restricted Visibility	5.1	Explanation Of Rule No. 19 With Special Emphasis On The Below:	K	5			R3, R5, R7, R53
		o	A Reminder That Rules Under Part B Section Ii (Conduct Of Vessels In Sight Of Each Other) Will Not Apply During Condition Of Restricted Visibility					
		o	There Is No 'Give-Way' Vessel And 'Stand-On' Vessel Under This Rule					
		o	This Rule Applies Not Only 'In' But Also 'Near An Area' Of Restricted Visibility					
		5.2	Explanation Of Meaning Of Below Terms:	U				
		o	Adapted To Prevailing Circumstances And Conditions Of Restricted Visibility					
			o	A Vessel Which Detects By 'Radar Alone' Presence Of Another Vessel Reduce Speed To A Minimum At Which She Can Be Kept On Her Course If Necessary, Take 'All Way Off' Navigate With Extreme Caution Until 'Danger Of Collision' Is Over				
	Day & Night signals	5.3	Describe day and night signals.	U	5	3		
		5.4	Describe/ recognize lights & shapes to be carried by ships when under way.	U/A				
		5.5	Describe/ recognize lights and shapes to be carried by ships when making way through water.	U/A				
		5.6	Describe/ recognize lights and shapes to be carried by ships when at anchor and when aground.	U/A				
		5.7	Describe lights and shapes to be carried by ships when not Under command (nuc), restricted in her ability to maneuver (ram) and when constrained by draft (cbd).	U/A				
		5.8	Describe/ recognize lights and shapes to be carried by ships when engaged in specialized activities.	U/A				
		5.9	Describe/ recognize lights and shapes to be carried by fishing vessels.	U/A				
		5.10	Sound and light signals - definitions, equipment for sound signals.	U				
		5.11	Describe the sound signals to be used by vessels in sight of one another including manoeuvring and warning signals.	U				
		Other Miscellaneous Rules and Situations	6.1	Rule 35 Sound Signals In Restricted Visibility				
	6.2		Rule 36 Signals To Attract Attention	K				
	6.3		Rule 37 - List The Distress Signals As Described In Rule 37.	U/K				
	6.4		Rule 38 Exemptions.	K/U				
	6.5		Overview Of The Annexures To Colregs.	K/U				
	6.6		Describe The Positioning, Spacing And Screening Of Lights.	U				

Detailed Teaching Syllabus

Subject code	UD11T5202	Block 1 Advanced Bridge Equipment & Watchkeeping
Subject name	Nav IV: Adv Bridge Equipment, Watch-keeping and Meteorology	Block 2 Meteorology

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES				
Adv Bridge Equipment & Watch Keeping	Collision Situations	6.7	Explain The Collision Avoidance Situations In The below listed Categories. In Each situation following points to be covered - Identification of Lights, Determining risk of collision, Action to avoid collision if risk of collision exist, Sound signals to be made, Any other relevant information related to particular situation	U								
		6.7.1	Open Sea									
		6.7.2	TSS & Narrow Channel									
		6.7.3	Restricted Visibility									
Meteorology	Condensation And Precipitation	7.1	Briefly explain Dew, Frost, Rime, Mist, Fog, Haze, Spray And Clouds	K	7	2	USE OF CLOUD ATLAS AND CLOUD CHARTS IS RECOMMENDED	R15, R16, R22, R23, R24, R26, R48, R49, R50				
		7.2	Describe Four Ways In Which Clouds Are Formed. Explain Classification Of Clouds As Per Appearance & As Per Height Above Sea Level	U								
		7.3	Define Visibility, Factors Affecting Visibility.	K								
	Pressure Winds And Storms	8.1	Explain Pressure Gradient And Basic Diagram Of The Seven Isobaric Systems.	U								
		8.2	Describe The Wind And Pressure Systems Over The Oceans. Explain Anabatic And Katabatic Winds, Land And Sea Breezes, Doldrums And Inter-Tropical Convergence Zones, Describe Coriolis Force.	U								
		8.3	Explain True And Apparent Wind. Calculate The Basic Wind Triangle.	U/A								
		8.4	Explain Buys Ballot's Law.	U								
		8.5	Explain The Basic Concepts Related To Tropical Revolving Storms (Trs)-, Weather Associated, General Direction Of Movement. Rule Of 1,2,3 to be Included	K								
		8.6	Explain different types of Fronts with Sketches	U								
		8.7	Explain the structure of Middle Latitude Depression	U								
		8.8	Explain Beaufort Scale Of Wind Force	U								
	Weather Observation	9.1	Interpret Symbols On Weather Charts And Identify Associated Weather.	A							USING AMVERSEAS SOFTWARE	
	Ocean Currents	10.1	Identify And Locate The Important Currents - Equatorial, Falkland, Gulf Stream, Benguela, Agulhas, Kuro-Shio, Kamchatka And Labrador, California, Brazil, Canary and Peru Currents On The World Map.	K					1		USE OF ROUTEING CHARTS RECOMMENDED.	R15, R16, R18, R40, R48, R49, R50
					50	17	Total 67 Hrs					

Methodology and Reference Books

Subject Code

UD11T5202Subject Name **Navigation IV: Advanced Bridge Equip, W/keeping and Meteorology**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Bridge Watch Keeping - by Capt. H. Subramaniam	R16	Marine Meteorology - by HMSO
R2	IMO Rules of the Road - by Bhandarkar Publications	R17	STCW
R3	Rules of the Road Manual - by Capt. Puri. S.K.	R18	Mariners Handbook (NP 100) - Admiralty
R4	International Lights, Shapes and Sound Signals - by D.A. Moore	R19	Radar and Electronic Navigation - by Sonnenberg, G.J.
R5	Bridge Procedure Guide - by ICS	R20	Modern Electronic Navigation Aids - by Bhatia
R6	Bridge Team Work - by Nautical Institute	R21	International Aeronautical and Maritime Search and Rescue Manual : Vol. 3 - by I.M.O
R7	A Guide to the Collision Avoidance Rules - by Cockcroft and Lameijer	R22	Cloud Types for Observers - by HMSO
R8	Admiralty Manual of Navigation - by HMSO	R23	Meteorology for Mariners - by HMSO
R9	Collision and Their Causes - by Richard A. Cahill	R24	Meteorology for Seafarers - by Frampton, R.M.
R10	Bridge Team Management : A Practical Guide - by Capt. A.J. Swift	R25	International Code of Signals - by I.M.O
R11	The Navigation Control Manual - by Bole, Dineley, Nicholas	R26	Meteorology Demystified : Self Teaching Guide - by Gibilisco Stan
R12	Shipborne Radar - by Capt. H. Subramaniam	R27	MK3012 and MK4016 (X and S Band) Radar : Service Manual
R13	IMO : Standard Marine Communication Phrases - by Sterling Book House	R28	IMO SMCP: IMO Standard Marine Communication Phrases - by I.M.O
R14	Bridge Equipment - by Capt. A.G. Bhatia	R29	Ships' Code and Decode Book - by The Met. Office
R15	Marine Meteorology - by Capt. H. Subramaniam	R30	Handbook for Marine Radio Communication - by Lees, G.D.

Methodology and Reference Books

Subject Code

UD11T5202

Subject Name **Navigation IV: Advanced Bridge Equip, W/keeping and Meteorology**

R31	Guide to Helicopter/Ship Operations - by ICS	R46	Parallel Indexing Techniques - by Smith, I.
R32	The Master's Role in Collecting Evidence - by The Nautical Institute	R47	International Regulations for Preventing Collisions at Sea - by Nautical Press
R33	Stranding and Their Causes - by Cahill R.A.	R48	Dynamical Meteorology : An Introductory Selection - by Atkinson, B.W.
R34	Monitoring Turns Using Radar - by Paul Chapman	R49	Meteorology at Sea - by Sanderson Ray
R35	Parallel Indexing - by Westwood, B.	R50	Meteorology - by Charles W. Roberts
R36	Bridge Watchkeeping - by Nautical Institute	R51	The Ship Handler's Guide - by Rowe, R.W.
R37	Managing Collision Avoidance at Sea - by Gilbert, W.U.L	R52	Nav Basics : Watchkeeping & Electronic Navigation Vol.3 - by Witherby Seamanship International Ltd.
R38	The Mariner's Guide to Marine Communications - by Ian Waugh	R53	A Mariner's Guide to Preventing Collisions - by Capt. Y. Chhabra
R39	Navigation for Masters - by House, D.J.		
R40	Notes on Meteorology - by Kemp		
R41	Radar and ARPA Manual - by Bole Alan		
R42	Radar Observer's Handbook : for Merchant Navy Officers - by Burger, W.		
R43	Ship Maneuvering Principles and Pilotage - by Williamson, Paul		
R44	GMDSS for Navigators - by P.C. Smith		
R45	A Seaman's Guide to the Rules of the Road - by Morgans Technical Books Ltd.		

Detailed Teaching Syllabus

Subject code	UD11T5203	Block 1 Cargo Handling & Care
Subject name		Block 2 Seamanship, Deck work & COSWP
Cargo Handling, Stowage & Seamanship II		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Cargo Handling And Care	Cargo Pumps And Piping Systems (Oil, Chemical And Gas Tankers)	1.1	Tanker Arrangement: Cargo Tanks, Pump Rooms, Slop Tanks, Cofferdams, Deep Tanks, Tank Coating	K	14	1			
		1.2	Cargo Piping System: Direct Pipe Line And Ring-Main System, Piping Arrangement In Pump Room. Single Tank And Single Pump System Using Top Lines On Deck	K					
		1.3	Cargo Pumps: LIST ONLY Different Types Of Pumps For Cargo Operations (Centrifugal Pumps, Various Positive Displacement Pumps - Reciprocating type, Screw type, Lobe & Vane type And Submersible Pumps Like Framo And Marflex Pumps), Use Of Eductors.	K					
		1.4	Hazards Of Oil Cargoes, MSDS [Petroleum And Toxicity Of Cargoes, Harmful gases - Inert gas, Nitrogen, Hydrogen Sulfide, Carbon Monoxide, Focus On Following Hazards: 1) Inhalation & Ingestion 2) Absorption Through The Epidermis (Skin) 3) Injury To Eyes (Irritation And Soreness) 4) Pollution Of Water And Air (Through Toxic Vapour) 5) Fire and Explosion Hazard]	K					
		1.5	Ship Shore Safety Checklist	K					
		1.6	Introduction To Inert Gas System, Significance and purpose for following operations - Loading and Discharging ONLY	K					
		1.7	Emergency Shut Down (ESD) System, (Explain Linked And Non-Linked ESD)	K					
		1.8	Gas Measuring Instruments (Oxygen Meters, Tankscope, Explosimeter, Multi-Gas Meter, & Drager Pump And Tubes)	K					
	Containerized Cargoes	2.1	State Types Of Containers	K	7	3			R42, R50, R52, R57
		2.1.1	Iso Standard Container Construction						
		2.1.2	Types Of Containers With Their Payload And Capacity, 20', 40', High Cube, Open Top, Tanktainer, Half Height, Insulated, Refrigerated, Flat Rack, Bulktainer, Ventilated Container (Fantainers)						
		2.1.3	Container Markings						
		2.1.4	Locking Arrangements, Seal						
		2.2	State Container Handling Gear	K					
2.2.1		Purpose Of Following: Shore Handling Gear Such As Portainers, Straddlers, Forklifts, Transtainer, Trailers, Spreaders, Ship Handling Gear Such As Cranes, Shiptainers, Spreaders, 4-Legged Slings.							

Detailed Teaching Syllabus

Subject code	UD11T5203	Block 1 Cargo Handling & Care
Subject name	Cargo Handling, Stowage & Seamanship II	Block 2 Seamanship, Deck work & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Cargo Handling And Care	Containerized Cargoes	2.3	Interpret Cargo Stow Plan-	A					
		2.3.1	Bay Plan, Bay-Row-Tier Nomenclature						
		2.3.2	Stack Weights						
		2.4	List Container Securing Equipment	K					
		2.4.1	Cargo Securing Manual						
		2.4.2	Fixed Securing Gear Such As Cell Guides, Lashing Bridge, Guide Cones, Etc.						
		2.4.3	Portable Securing Gear Such As Twistlocks, Lashing Rods, Turnbuckle, Single / Double Stackers, Bridge Fitting, Extension Hooks, Penguin Looks, Etc.						
		2.5	Interpret Cargo Documentation	A					
		2.5.1	Stow Plan / Bay Plan						
		2.5.2	Reefer Cargo Manifest						
		2.5.3	Dangerous Cargo Manifest And Packing List, Dangerous Goods Stowage Plan, Dangerous Goods Document Of Compliance (DOC)						
		2.5.4	Reefer Temperature Logs.						
	Other Special Cargoes	3.1	List Types Of Bulk Cargoes	K	7	4			R1, R2, R3, R38, R39, R41, R42, R44, R50, R56, R58
		3.1.1	Hygroscopic Cargoes						
		3.1.2	Heavy Density Cargoes						
		3.1.3	Cargoes Likely To Get Tainted						
		3.1.4	Cargoes Liable To Shift / Liquefy						
		3.1.5	Cargoes Liable To Spontaneous Combustion						
		3.2	State Cargo Stowage Requirements-	K					
		3.2.1	Code Of Safe Practice For Loading Unloading Of Bulk Cargoes (BLU Code – Check List Only)						
		3.2.2	The International Maritime Solid Bulk Cargoes (IMSBC) Code (– Over View Only)						
		3.2.3	Stow Plan And Loading Sequence As Per BLU Code						
		3.2.4	Definitions Of Angle Of Repose, Flow Moisture Point And Transportable Moisture Limit, Flow State, Moisture Content, Moisture Migration						
3.2.5	Hazards Associated With Coal Cargo And Bulk Grain Cargo								
3.2.6	Material Safety Data Sheets (MSDS)								
3.3	Carriage Of Dangerous Cargo In Packaged Form- Explain Segregation / Stowage Requirements Between Different Class Of IMO Cargo As Per IMDG Code Including EMS And MFAG References (General Cargo Vessels)	U							
3.4	Describe With Respect To Holds-	U							
3.4.1	Preparation Of Hold Prior Loading Clean / Dirty Cargoes								

Detailed Teaching Syllabus

Subject code	UD11T5203	Block 1 Cargo Handling & Care
Subject name	Cargo Handling, Stowage & Seamanship II	Block 2 Seamanship, Deck work & COSWP

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Cargo Handling And Care		3.4.2	Hatch Cover Operation And Testing For Weather Tightness						
		3.4.3	Precautions To Be Taken Prior Entering Cargo Holds						
		3.5	Describe Cargo Handling Gear (Only Overview)	U					
		3.5.1	Purpose Of The Following: Bulk Grabs, Pulp Frames, Drum Hooks, Paper Compressors, Vacuators						
		3.5.2	Explain Purpose And Procedure For Making Entries In Register Of Lifting Appliances And Cargo Handling Gear (Chain Register).						
	Other Special Cargoes	3.6	List Cargo Documentation:	K					
		3.6.1	Stow Plan						
		3.6.2	Ship / Shore Interface Checklist As Per BLU						
		3.6.3	Mates Receipt & Bills of Lading						
	Multipurpose Ships		4.1	List Types Of Cargoes Carried By Multipurpose Ships	K	4			R8, R9, R42, R50
			4.2	State Cargo Securing Manual And Its Content	K				
			4.3	State Contents Of Capacity Plan	K				
			4.3.1	Cargo Decks And Lashing Points	K				
			4.4	List Loading Ramps Types-	K				
			4.4.1	External Stern Ramps	K				
			4.4.2	Internal Ramps And Lifts	K				
			4.5	State Requirements For Ventilation Systems And Fire Precautions To Be Taken.	K				
			4.6	Cargo Watch Keeping On A General Cargo Vessel. Basic cargo w/k principles common to various types of ships	K				

Detailed Teaching Syllabus

Subject code Subject name		UD11T5203 Cargo Handling, Stowage & Seamanship II			Block 1 Cargo Handling & Care Block 2 Seamanship, Deck work & COSWP						
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES			
Seamanship, Deck Work & COSWP	Tackles And Purchases	5.1	Explain The Standard Crane Signals	U	10			R30, R31, R32, R34			
		5.2	Explain The Use Of Various Slings; Method Of Shortening Rope Sling.	U							
	Anchors & Anchor Work	6.1	Explain Anchor Work. Describe The Parts Of A Windlass	U				R31, R32, R34			
		6.2	Explain The Following Terms In Connection With Anchor Work: Cable, Link, Swivel, Joining Shackle, Shackle As A Term Of Length, Bitter End, A'cockbill (Anchor Ready For Letting Go), Anchor Aweigh, Clear Hawse, Foul Hawse, Clear Or Foul Anchor, Dragging, Long Stay, Short Stay, Up And Down, To Veer Cable, Weighing Anchor, Yawing, Brought Up To Three In Water / Four On Deck, Etc.	U							
		6.3	Explain The Method For Securing Anchor For Sea, Covering Spurling Pipe, Marking On Anchor Cable, Use Of Chain Hook, Describe How Anchors Should Be Kept Ready For Use In Emergency.	U							
	COSWP	7	Reference To Code Of Safe Working Practices Explain The Following:	U				15	5	BUNKERING CHECKLIST	R35
		7.1	Safety Precautions While Anchoring, Precautions When Anchoring In Deep Waters								
		7.2	Safety Precautions While Repairing Radar								
		7.3	Safety Precautions While Entering Battery Room								
		7.4	Safety Precautions While Using Bosun's Chair								
		7.5	Safety Precautions While Rigging Gangway And Pilot Ladder								
		7.6	Describe The Importance Of Personnel Health And Hygiene On Board Ship								
	7.7	Permit System - Hot Work Permit, Cold Work Permit, Entry In Enclosed Space Permit, Working Aloft Permit, Working Overside Permit, Electrical Isolation Permit, Lockout And Tag Out Procedures.									
	7.8	List Safe Bunkering Practices	K								
	7.9	Demonstrate Entry Into Enclosed Space	K								
					57	13	Total 70 Hrs				

Methodology and Reference Books

Subject Code

UD11T5203

Subject Name **Cargo Handling, Stowage & Seamanship II**

TEACHING METHODOLOGY			
L	Lecture (Hours)	P	Practical (Hours)
N	Numerical (Hours)	E	Exercise (Hours)
		D	Demonstration

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Cargo Work - by L.G. Taylor	R16	International Code for the Safe Carriage of Grain in Bulk - by I.M.O
R2	Cargo Work for Ships Officers - by Capt. Errol Fernandes	R17	International Code for Safe Carriage of Chemicals in Bulk (IBC Code) - by I.M.O
R3	Cargo Work - by Kemp and Young	R18	International Code for Safe Carriage of Gases in Bulk (IGC Code) - by I.M.O
R4	Seamanship and Cargo Work - by Capt. J. Dinger	R19	International Maritime Dangerous Goods Code (IMDG Code) - by I.M.O
R5	Stowage of Cargo - by O. O. Thomas	R20	Containerization and Other Unit Transport - by G. Vanderburg
R6	Watchkeeping Safety and Cargo Management in Port - by Capt. Peter Roberts, N.I.	R21	Basic Handling and Care of Cargo - IMO Model Course No. 1.18
R7	Sea Trading - by William Packard - Fairplay	R22	Steel Carriage by Sea - by Sparks
R8	Code of Safe Practice for Cargo Stowage and Securing - by I.M.O.	R23	Lashing and Securing of Deck Cargoes - by John Knott
R9	Code of Practice : Roll-on/Roll-off Ships, Stowage and Securing of Vehicles - by I.M.O	R24	Hatch Cover Maintenance and Operation - N of E P & I
R10	Marpol 73/78 Consolidated Edition - by I.M.O.	R25	Tanker Safety Guide - by ICS (Petroleum, Gas and Chemical)
R11	Load Line Convention 1966 - by I.M.O	R26	International Safety Guide for Tankers and Terminals (ISGOTT) - by OCIMF
R12	Dock Safety Regulations - by I.L.O	R27	Bulk Transfer of Dangerous Liquids and Gases Between Ship and Shore - by SIGTTO
R13	International Maritime Solid Bulk Cargoes (IMSBC) Code - by I.M.O	R28	Liquefied Gas Carriers : Your Personal Safety Guide - by SIGTTO
R14	Code of Practice for Safe Loading and Unloading of Bulk Cargoes (BLU Code) - by I.M.O	R29	Admiralty Manual of Seamanship (Consolidated) London - by HMSO
R15	Code of Safe Practice for Ships Carrying Timber Deck Cargoes - by I.M.O	R30	Seamanship Notes - by Kemp, J.F.

Methodology and Reference Books

Subject Code

UD11T5203

Subject Name **Cargo Handling, Stowage & Seamanship II**

R31	The Boatswain's Manual - by Mcleod, William A. and Miller	R46	Liquefied Gas Fire Hazard Management - by SIGTTO
R32	Theory and Practice of Seamanship - by Danton, Graham	R47	Liquefied Gases Marine Transportation and Storage - by Vaudolon, Alain
R33	Nicholl's Seamanship and Nautical Knowledge - by Cockcroft, A.N.	R48	Liquefied Gas Handling Principles on Ships and in Terminals - by McGuire
R34	Seamanship Primer - by Dinger, Jagmohan	R49	Quantity Calculations LPG and Chemical Gases - by Beernaert, D.
R35	Code of Safe Working Practice for Merchant Seaman - by MSA, UK	R50	Illustrated Dictionary of Cargo Handling - by Brodie P.R.
R36	Safe Oil Tanker Operations - by Capt. K.S. Mistree and Mr. B.K. Sharma	R51	Ship to Ship Transfer Guide: Liquefied Gases - by ICS
R37	Safe Gas Tanker Operations - by Capt. K.S. Mistree and Mr. B.K. Sharma	R52	Storck Guide Stowage & Segregation to IMDG Code - by Storck Verlag Hamburg
R38	Cargo Work for Maritime Operations - by House, D.J.	R53	Prevention of Oil Spillages through Cargo Pump Room Sea Valves - by ICS
R39	Thomas Stowage : the Properties and Stowage of Cargoes - by Pepper, G.M.	R54	Crude Oil Washing Systems - by I.M.O
R40	Liquefied Gas Carriers : Your Personal Safety Guide - by Dirchester Maritime Ltd.	R55	Crude Oil Tanker Basics - The Theory and Practice Of Crude Oil Cargo Operations - by Armitage, Paul
R41	Hatch Cover Maintenance and Operation - by Byrne David	R56	Hatch Covers Operation, Testing and Maintenance - by Wall, Mike
R42	Cargo Stowage and Securing - by Bliault, Charles	R57	The Carriage of Cargoes : Vol. 1 The Carriage of Packaged Cargoes and Cargo Units (Including Containers and Vehicles) - by M.C.A
R43	Fully Refrigerated LPG Carriers - by Harris Syd	R58	The Carriage of Cargoes : Vol.2 Solid Bulk Cargoes : Instructions for the Guidance of Surveyors - by M.C.A
R44	Draught Surveys - by Dibble, W.J.	R59	An Introduction to the Design and Maintenance of Cargo System Pressure Relief Valves onboard Gas Carriers - by SIGTTO
R45	Ship to Ship Transfer Guide : Petroleum - by ICS		

Detailed Teaching Syllabus

Subject code	UD11T5204	Block 1 Ship Construction
Subject name		Ship Construction & Ship Stability II
		Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Ship Construction	Hull Structure and Ship's Plans	1.1	Sketch And Label A Profile View Of A Typical Double Hull Tanker, Showing Bulkheads, Cofferdams, Pump-Room, Engine-Room, Bunker And Peak Tanks, Cargo Tanks Permanent Ballast Tanks.	A	8 T	18 N		R1,R6, R7, R8, R9, R10, R11
		1.2	Sketch And Label A Profile View Of A Typical Gas Carrier, Showing Containment Systems, Compressor Rooms, Cofferdams, Engine-Room, Bunker And Peak Tanks, Ballast Tanks.	A				
		1.3	Sketch And Label A Profile View Of A Container Ship Showing Holds, D.B. Arrangements, Peak Tank Arrangements, Engine Room & Cell Guide Arrangement.	A				
		1.4	Sketch And Label A Profile View With A Profile View Of Ro-Ro Ship Showing Mid Ship Ramp Arrangement, Stern Ramp Arrangement, Car Decks, D.B. Arrangement, Slope Ways & Gastight Zones.	A				
		1.5	Describe The Content Of Different Types Of Plans, E.G. G/A Plan, FFA Plan, LSA Plan, Pumping And Piping Arrangement, Shell Expansion Plan, Capacity Plan.	U				
		1.6	Identify Structural Components On Ship's Plans And Drawings () And Define	A				
		1.6.1	Frames, Floors, Transverse Frames, Deck Beams, Knees, Brackets	A				
		1.6.2	Shell Plating, Decks, Tank Top, Stringers	A				
		1.6.3	Bulkheads And Stiffeners, Pillars	A				
		1.6.4	Hatch Girders And Beams, Coamings, Bulwarks	A				
		1.7	Describe And Illustrates Standard Steel Sections	U/A				
		1.7.1	Flat Plate	U/A				
		1.7.2	Offset Bulb Plate	U/A				
		1.7.3	Equal Angle	U/A				
		1.7.4	Unequal Angle	U/A				
		1.7.5	Channel	U/A				
		1.7.6	Tee	U/A				
		1.8	Explain Longitudinal, Transverse And Combined Systems Of Framing On Transverse Sections Of Ships	U				
		1.9	Illustrate Double-Bottom Structure For Longitudinal And Transverse Framing	A				
		1.10	Sketch The Deck Edge, Showing Attachment Of Sheer Strake And Stringer Plates	A				
	1.11	Define Gross Tonnage (GT) And Net Tonnage (NT)	K					
	Ship Stresses	2.1	Define Terms Shear Force (SF) And Bending Moments (BM)	K	4		Loadicator	R6, R7, R8, R9, R10, R11
		2.2	Explain What Is Meant By 'Hogging' And By 'Sagging' And Distinguish Between Them	U				

Detailed Teaching Syllabus

Subject code	UD11T5204	Block 1 Ship Construction
Subject name		Ship Construction & Ship Stability II
		Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Ship Construction	Ship Stresses	2.3	Describe The Loading Conditions Which Give Rise To Hogging And Sagging Stresses	U				
		2.4	Describe Liquid Pressure Loading On The Tank Structures. Stress due to Torsion on Hull girder	U				
		2.5	Describe Qualitatively The Stresses Set Up By Liquid Sloshing In A Partly Filled Tank	U				
		2.6	Describe Racking Stress And Its Causes	U				
		2.7	Explain What Is Meant By 'Pounding' Or 'Slamming' And List Which Part Of The Ship Is Affected	U				
		2.8	Explain What Is Meant By 'Panting' And List Which Parts Of The Ship Are Affected?	U				
		2.9	Describe Stresses Caused By Localized Loading	U				
		2.10	Describe The Input And Output Data From Stress Calculation Machines. Briefly state about class certificate of loadicator, approved loadicator manual & approved test conditions & testing requirements by ship staff & annual testing in presence of Class	U				
	Fittings, Bow And Stern, Rudder And Propeller	3.1	Describe The Cleating Arrangements For The Hatch Covers	U	6			
		3.2	Draw A Sketch Of A Typical Forecastle Mooring And Anchoring Arrangements (Hawse Pipe, Spurling Pipe, Cable Stopper, Bitter End, Chain Locker), Showing The Leads Of Moorings	A				
		3.3	Describe The Bilge Piping System Of A Cargo Ship	U				
		3.4	Describe That Each Section Is Fitted With A Screw-Down Non Return Suction Valve.	U				
		3.5	Describe The Arrangement Of A Fire Main And List What Pumps May Be Used To Pressurize It	U				R6, R7, R8, R9, R10, R11
3.6		Sketch And Label Air Pipes To Ballast Tanks / Fuel Oil Tanks	K/A					
		3.7	Describe The Use Of Save-All And Drip Trays.	U				
Ship Stability	Statical Stability	4.1	Transverse Stability		9	19		R2, R3, R4, R5, R12
		4.1.1	State That Weight Is The Force Of Gravity On A Mass And Always Acts Vertically Downwards	K				
		4.1.2	State That The Total Weight Of A Ship And All Its Contents Can Be Considered To Act At A Point Called The Centre Of Gravity (G)	K				
		4.1.3	Define The Centre Of Buoyancy (B) As Being The Centroid Of The Underwater Volume Of The Ship	K				
		4.1.4	State That The Total Force Of Buoyancy Always Acts Vertically Upwards	K				
		4.1.5	Explain That The Force Of Buoyancy Can Be Considered As A Single Force Acting Through B	U				

Detailed Teaching Syllabus

Subject code	UD11T5204	Block 1 Ship Construction
Subject name		Ship Construction & Ship Stability II
		Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Ship Stability	Statical Stability	4.1.6	Explain That When The Shape Of The Underwater Volume Of A Ship Changes The Position Of B (Center of Buoyancy) Also Changes	U					
		4.1.7	State That The Position Of B Will Change When The Draught Changes And When Heeling Occurs.	K					
		4.1.8	Label A Diagram Of A Mid-Ship Cross-Section Of An Upright Ship To Show The Weight Acting Through G And The Buoyancy Force Acting Through B	A					
		4.1.9	State That The Buoyancy Force Is Equal To The Weight Of The Ship	K					
		4.1.10	Label A Diagram Of A Mid-Ship Cross-Section Of A Ship Heeled To A Small Angle To Show The Weight Acting Through G And The Buoyancy Force Acting Through B	A					
		4.1.11	Describe Stability As The Ability Of The Ship To Return To An Upright Position After Being Heeled By An External Force	U					
		4.1.12	Define The Lever GZ As The Horizontal Distance Between The Vertical Forces Acting Through B And G	K					
		4.1.13	State That The Forces Of Weight And Buoyancy Form A Couple	K					
		4.1.14	State That The Magnitude Of The Couple Is Displacement X Lever, (W X Gz)	K					
		4.1.15	Explain How Variations In Displacement And Gz Affect The Stability Of The Ship	U					
		4.1.16	On A Diagram Of A Heeled Ship, Show :	A					
		4.3.16.1	The Forces At B And G	K					
		4.3.16.2	The Lever Gz	K					
		4.1.17	State That The Length Gz Will Be Different At Different Angles Of Heel. General idea of a GZ curve	K					
		4.1.18	State That If The Couple W X Gz Tends To Turn The Ship Towards The Upright, The Ship Is Stable	K					
		4.1.19	State That For A Stable Ship :	K					
		4.1.19.1	W X Gz Is Called The Righting Moment	K					
		4.1.19.2	Gz Is Called The Righting Lever	K					
		4.2	Initial Stability						
		4.2.1	Define Transverse Metacentre (M) As The Point Of Intersection Of Successive Buoyancy Force Vectors As The Angle Of Heel Increases By A Small Angle. Show On A Given Diagram Of A Stable Ship That M Must Be Above G And States That Metacentric Height GM Is Taken As Positive.	K					
		4.2.2	Calculations Regarding Use Of The Formula $GZ = GM \times \sin\theta$	A					
		4.2.3	Explain That The Value Of GM Is A Useful Guide To The Stability Of The Ship.	U					
		4.2.4	Describe The Effect On A Ship's Behavior Of A Large GM (Stiff Ship) And A Small GM (Tender Ship)	U					

Detailed Teaching Syllabus

Subject code	UD11T5204	Block 1 Ship Construction
Subject name		Ship Construction & Ship Stability II
		Block 2 Ship Stability

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Ship Stability	Statical Stability	4.2.5	Explain The Concept Of Free Surface Effect (FSE)	U					
		4.2.6	Use Hydrostatic Tables To Find KM At Given Drafts.	A					
		4.2.7	Given The Value Of KG, Use The Value Of KM Obtained From Hydrostatic Tables To Find GM.	A					
		4.2.8	State That, For A Cargo Ship, The Recommended Initial GM Should Not Normally Be Less Than 0.15m	K					
		4.2.9	Calculate Using Moment By The Keel, The Position Of G After Loading Or Discharging Given Masses At Stated Positions.	A					
		4.2.10	Calculate The Arrival GM From The Departure Conditions And The Consumption Of Fuel And Water, Including The Loss Of GM Due To FSE	A					
		4.2.11	Explain "States Of Equilibrium" And Define Angle Of Loll.	U					
	List And Trim	5.1	List And Its Corrections		10				
		5.1.1	Show On A Diagram The Forces Which Cause A Ship To List When G Is To One Side Of The Centre Line	K					
		5.1.2	State That The Listing Moments Is Given By Displacement X Transverse Distance Of COG From The Centre Line In Case Of Loading Or Discharging. Incase Of Shifting The Transvrese Distance Is The Total Distance Shifted.	K					
		5.1.3	Show On A Diagram That The Angle Of List ϕ Is Given By $\tan \phi = GG1 / GM$ Where GG1 Is The Transverse Shift Of COG From The Centre Line	K					
		5.1.4	Given The Displacement, KM And KG Of A Ship Calculates The Angle Of List Resulting From, Loading Or Discharging A Given Mass At A Stated Position, Or From Moving A Mass Through A Given Transverse Distance	A					
		5.1.5	Explain With Reference To Moments About The Centre Line How The List May Be Removed	U					
		5.1.6	Given The Displacement, GM And Angles Of List Of A Ship, Calculates The Mass To Move Through A Given Transverse Distance, Or The Mass To Load/ Discharge At A Given Position To Bring The Ship Upright	A					
		5.2	Trim						
		5.2.1	Define 'Trim' As The Difference Between The Draught Forward And Draught Aft	K					
		5.2.2	Define Centre Of Flotation (COF), Hydrostatic Draft, Trim Caused & Moment To Change The Trim By 1 Cm (MCTC)	K					
		5.2.3	State That Trim May Be Changed By Moving Masses Already On Board Forward Or Aft, Or By Adding Or Removing Masses From Forward Or Aft. (TRIM PROBLEMS OF TYPE-A, B OR C SHOULD NOT BE INCLUDED)	K					
		5.3	MV HINDSHIP to be used for 5.3.1 & 5.3.2, Numerical 1 - 25 only						
		5.3.1	Brief Familiarization Of The Layout And Contents Of The Typical Stability Booklet	K					
	mv Hindship								

Detailed Teaching Syllabus

Subject code Subject name	UD11T5204 Ship Construction & Ship Stability II	Block 1 Ship Construction Block 2 Ship Stability						
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Ship Stability	mv Hindship	5.3.2	Problems In Stability Based On A Typical Stability Booklet Covering The Topics Mentioned Above Including Determination Of Hydrostatic Particulars In A Given Density, Deadweight And Draft, Calculation Of Hydrostatic Draft From Drafts Forward And Aft, & KG By Moments And Final GM	A				
					37	37	Total 72 Hrs	

Methodology and Reference Books

Subject Code

UD11T5204

Subject Name **Ship Construction & Ship Stability - II**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Ships & Naval Architecture - by R. Munro-Smith	R7	Ship Construction Notes for Ship Mates - by Edrich Fernandes
R2	Ship Stability - by Derrett	R8	Ship Design and Construction Vol. 1 - by Thomas Lamb
R3	Problems in Stability on M.V. Hindship - by Capt. T.K. Joseph & Capt. Rewari	R9	Ships Constructions - by D.J. Eyres
R4	Particulars of M.V. Hindship	R10	Merchant Ship Construction - by Pursey, H.J.
R5	Ship Stability Part-1 - by Capt. H. Subramaniam	R11	Ship Stability OOW - by Martin Rhodes
R6	Ship Construction, Sketches & Notes - by Kemp & Young		

Detailed Teaching Syllabus

Subject code	UD11T5205	Block 1 MARPOL (Environmental Protection)
Subject name		Block 2 Basic Marine Engineering Knowledge
MARPOL & Marine Engineering Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
MARPOL (Environmental Protection)	MARPOL 73/78 (Background & Context)	1.1	The International Convention For The Prevention Of Pollution From Ships, 1973 As Modified By The Protocol Of 1978 Relating Thereto (Marpol 73/78) Including Brief History Of Convention.	K	7			R1
		1.1.1	State The Effects Of Pollution On Environemt, Industry And Humans	K				
		1.1.2	List The Annexes To The Marpol Convention With Date Of Enforcement	K				
		1.1.3	Define Special Areas, List Special Areas As Per Each Annex With Date Of Enforcement	K				
		1.1.4	Explain The Particularly Sensitive Sea Areas (PSSA).	U				
	Annex I	1.2	Introduction To Annex I & Its Applicability	U				
		1.2.1	Define Following Terms - Oily Mixture, Oil Fuel, Oil Tanker, Tank, Wing Tank, Centre Tank, Slop Tank, Dirty Ballast, Clean Ballast, Segregated Ballast, Instantaneous Rate Of Discharge, Oil Tanker, Combination Carrier, Nearest Land	U				
		1.2.2	State The Conditions Under Which Oily Mixtures May Be Discharged Into The Sea From An Oil Tanker	U				
		1.2.3	State The Condition Under Which Oily Mixtures From Machinery Space Bilges May Be Discharged Into The Sea	U				
		1.2.4	State That Residues Which Cannot Be Discharged Into The Sea In Compliance With The Regulations Must Be Retained Onboard Or Discharged To Reception Facilities	K				
		1.2.5	State That Every Oil Tanker Operating With Crude Oil Washing Systems Should Be Provided With An Operations And Equipment Manual	K				
		1.2.6	State The Requirements For The Provision Of Oil Record Books on Oil Tanker. List The Entries Required With Respect To Cargo Or Ballast Operations In Oil Tankers In Oil Record Book Part 2	K				
		1.2.7	State That The Oil Record Book Should Be Kept Onboard Readily Available For Inspection And Should Be Preserved For A Period Of Three Years After The Last Entry Has Been Made	K				
		1.2.8	Discuss Shipboard Oil Pollution Emergency Plan With Key Points & List Of SOPEP Equipment	U				
		Annex II	1.3	Marpol Annex II – Noxious Liquid Substances In Bulk				
1.3.1	State That The Requirements Of Annex II Apply To All Ships Carrying Noxious Liquid Substances In Bulk		K					
1.3.2	State That Noxious Liquid Chemicals Are Divided Into Four Categories W, X, Y, Z, And Other Substances (OS) Such That Substances In Category X Pose The Greatest Threat To The Marine Environment And Those In Category Other Substances (OS) The Least		K					
1.3.3	State That The Conditions For The Discharge Of Any Effluent Containing Substances Falling In Those Categories Are Specified		K					

Detailed Teaching Syllabus

Subject code	UD11T5205	Block 1 MARPOL (Environmental Protection)
Subject name		Block 2 Basic Marine Engineering Knowledge
MARPOL & Marine Engineering Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
MARPOL (Environmental Protection)	Annex II	1.3.4	State That Each Ship Which Is Certified For The Carriage Of Noxious Liquid Substances In Bulk Should Be Provided With A Procedures And Arrangements Manual and Certificate of Fitness	K					
		1.3.5	State That Each Ship Should Be Provided With A Cargo Record Book Which Should Be Completed, On A Tank By Tank Basis, Whenever Any Operations With Respect To A Noxious Liquid Substance Take Place	K					
		1.3.6	State What is SMPEP ? What is it's significance?	K					
	Annex III	1.4	Marpol Annex III – Harmful Substances Carried By Sea In Packaged Forms, Or In Freight Containers Portable Tanks Or Road And Rail Tank Wagons	K					2
		1.4.1	State That For The Purpose Of This Annex, Empty Receptacles, Freight Containers And Portable Road And Rail Tank Wagons Which Have Been Used Previously For The Carriage Of Harmful Substances Are Treated As Harmful Substances Themselves Unless Precautions Have Been Taken To Ensure That They Contain No Residue That Is Hazardous To The Marine Environment	K					
		1.4.2	State That Packaging, Containers And Tanks Should Be Adequate To Minimize Hazard To The Marine Environment	K					
		1.4.3	List The Requirements For Marking And Labeling Packages, Freight Containers, Tanks And Wagons	K					
	Annex IV	1.5	Marpol Annex IV – State The Provisions Regarding The Discharge Of Sewage Into The Sea	K					1
		1.5.1	Explain The Meaning Of Sewage (Black Water) And Grey Water						
		1.5.2	State The Requirement Of Sewage Systems - Holding Tank Arrangement, Comminution & Disinfection System And Sewage Treatment System						
		1.5.3	State Conditions Under Which Sewage Can Be Discharged Into The Sea						
	Annex V	1.6	Introduction To Annex V & Its Applicability	K					4
		1.6.1	Explain The Meaning Of Garbage And Effects On Marine Environment	K					
		1.6.2	State The Different Categories Of Garbage Part 1 - A, B, C, D, E, F, G, H, I (Plastics, Food Waste, Domestic Waste, Cooking Oil, Incinerator Ash, Operational Waste, Animal Caracass, Fishing Gear, E-Waste) And Part 2 - J, K (Cargo Residue - Not Hazardous to Marine Environment , Cargo Residue - Hazardous to Marine Environment)	K					
		1.6.3	State Categories And Conditions Under Which Discharge Of Garbage Is Permitted	K					
		1.6.4	State Disposal Requirements For Expired Medicines, Expired Pyrotechnics, Batteries And Tube Lights	K					
		1.6.5	State The Requirement Of Placards & Garbage Management Plan And Their Contents	K					

Detailed Teaching Syllabus

Subject code	UD11T5205	Block 1 MARPOL (Environmental Protection)
Subject name		Block 2 Basic Marine Engineering Knowledge
MARPOL & Marine Engineering Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
MARPOL (Environmental Protection)	Annex V	1.6.6	State The Requirements Of Garbage Record Book Part 1 & Part 2 And Its Retention Time. List The Entries Required With Respect To Disposal Of Garbage	K				
	Annex VI	1.7	Introduction To Annex VI & Its Applicability	K	3			
		1.7.1	Discuss Sources Of Emission Of Following Harmful Gases From Ships That Are Covered Under This Annex	U				
		1.7.1.1	Ozone Depleting Substances (ODS)					
		1.7.1.2	Nox Emmisions					
		1.7.1.3	Sox Emissions					
		1.7.1.4	Volatile Organic Compounds (VOCs)					
		1.7.1.5	Exhaust Gases From Shipboard Incinerators					
		1.7.2	Explain The Effects Of These Harmful Gases On Environment	U				
		1.7.3	Explain The Control Measures To Reduce Emission Of These Harmful Gases	U				
1.7.4	State That Few Environmentally Sensitive Areas Are Designated As 'Emission Control Areas' (ECAs) And While Within These Areas Ships Are Allowed To Burn Only Fuel With Much Lower Sulphur Content	K						
1.7.5	List Out The Different 'ECA' Areas Which Are Adopted World-Wide And The Maximum Sulphur Content Permitted In The Marine Fuels Consumed By Ships In Those Areas State The Maximum Sulphur Content That Is Permitted In Marine Fuels Consumed By Ships Outside ECA Areas	K						
MARPOL (Environmental Protection)	Ballast Water Management & Treatment Systems	1.8	State That 'The International Convention For The Control And Management Of Ships' Ballast Water And Sediments' Requires That All Ships Are Required To Have On Board And Implement A 'Ballast Water Management Plan' Which Is Approved By The Administration	K	3			
		1.8.1	State That Above Regulation Is Aimed At Preventing The Transfer And Spread Of Harmful Aquatic Organisms And Pathogens From One Part Of The World To Other Through Ship's Ballast Water	K				
		1.8.2	State That Under This Regulation, It Is Required That Ships Must Have A 'Ballast Water Record Book' Which Is Used For Recording The Location, Date And Time At Which Ballast Water Is Taken On Board And Discharged Back Into The Sea.	K				
		1.8.3	State That Under This Regulation, If It Is Decided To Do 'Ballast Water Exchange' At Sea, It Should Be Done Preferably At Distances > 200 Nm From Nearest Land And In Depths > 200 M If Above Not Possible Due To The Limitations Along Ship's Route Then Atleast At Distances Not Less Than 50 Nm From Nearest Land And In Depths > 200 M	U				
		1.8.4	State Requirement of Ballast Water Treatment Systems And Solid Ballast.	K				

Detailed Teaching Syllabus

Subject code	UD11T5205	Block 1 MARPOL (Environmental Protection)
Subject name		Block 2 Basic Marine Engineering Knowledge
MARPOL & Marine Engineering Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
MARPOL (Environmental Protection)	Anti-Fouling Systems	1.9	State That "International Convention On The Control Of Harmful Anti-Fouling Systems On Ships" Requires That Ships Shall Not Anymore Use Anti-Fouling Paints Which Contains 'Organo-Tin' (Tin Based Compounds) Which Is Causing Harm To Marine Life And Which Can Enter The Human Food Chain.	K	2			
		1.9.1	State 3 alternatives to Anti-fouling paint	K				
Basic Marine Engineering Knowledge	Engine Room Layout	2.1	Engineering / Engine Room Terminology	K	24	2	ENGINE ROOM MODEL	R9, R20
		2.2	List Machineries In Engine Room	K				
		2.3	List Types Of Valves And Their Functions	K				
	Electrical, Hydraulic , Pneumatic & Other Equipment	3	State the Purpose of Following Machineries -	K				
		3.1	Main And Auxiliary Engine	K				
		3.1.1	Draw a block diagram of a 2 stroke and 4 stroke engine. Compare their advantages and disadvantages.	U				
		3.1.2	List ME Alarms and Trips	K				
		3.2	Boiler	K				
		3.2.1	List the uses of Steam on ship	K				
		3.2.2	Explain working of Water Tube boiler	U				
		3.2.3	List Boiler mountings, alarms & trips	K				
		3.3	Air Compressor And Air Bottle	K				
		3.4	Pumps: Centrifugal, Positive Displacement (Reciprocating, Screw, Lobe & Vane)	K				
		3.4.1	Explain working principle of Screw Pumps, Gear Pumps, Reciprocating Pumps and Centrifugal pumps	U				
		3.4.2	Compare advantages and disadvantages of Positive Displacement Pumps (Screw Pump, Reciprocation Piston, Rotary lobe & Vane type) and Dynamic (Centrifugal) P/Ps	U				
		3.5	Evaporators	K				
		3.6	Oily Bilge Water Separators	K				
		3.7	A/C And Refrigeration Plant	K				
		3.8	Steering Gear	K				
		3.8.1	State what all tests are carried out on Steering Gear before departure (Solas Regulation)	K				
3.8.2	List types of Steering Gear - RAM Type & Rotary Vane type	K						
3.8.3	What is Follow Up and Non-follow Up (NFU) steering ?	U						
3.9	Propeller - Types of Propeller	K						

Detailed Teaching Syllabus

Subject code	UD11T5205	Block 1 MARPOL (Environmental Protection)
Subject name		Block 2 Basic Marine Engineering Knowledge
MARPOL & Marine Engineering Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Basic Marine Engineering Knowledge	(Hydraulics And Pneumatics)	3.10	State The Advantages Of Hydraulic System	K				
		3.11	State Pascal's And Bernoulli's Principle	K				
		3.12	State Characteristics And Chemical Hazards Of Hydraulic Fluid.	U				
		3.13	Explain Purpose Of Pressure Control Valves And Flow Control Valves	U				
		3.14	State The Safety Precautions To Be Observed While Working On Hydraulic System. List The Dangers Associated With Hydraulic System.	K				
		3.15	Explain The Importance Of Correct Sealing Of Joints.	U				
		3.16	List The Safety Precautions To Be Used While Working With Compressed Air. Lists And Explains Hazards That Can Occur From Compressed Air.	K				
					50	2	Total 52 Hrs	

Methodology and Reference Books

Subject Code

UD11T5205Subject Name **MARPOL & Marine Engineering Knowledge**

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	Marpol 73/78	R11	Diesel Motorships' Engines and Machinery : Vol.1 : Diagrams - by Christen Knak
R2	International Convention on Ballast Water Management	R12	Diesel Motorships' Engines and Machinery : Vol.2 - by Text Christen Knak
R3	International Convention on Anti-Fouling Paint Pollution	R13	Internal Combustion Engine Fundamentals - by Heywood, J.B.
R4	Marine Engineering - by Harrington R.I.	R14	Practical Marine Electrical Knowledge - by Dennis. T. Hall
R5	Refrigeration and Air Conditioning - by Arora, C.P.	R15	Basic Marine Engineering - by Dhar, J.K.
R6	Principles of Refrigeration - by Dossat, Roy	R16	The Maritime Engineering Reference Book : A Guide to Ship Design, Construction and Operation - by Anthony F. Molland
R7	Reed's General Engineering Knowledge for Marine Engineers : Vol.8 - by Jackson, L.	R17	Machine Drawing - by Bhatt, N.D. and Panchal, V.M.
R8	Reed's Steam Engineering Knowledge for Marine Engineers : Vol.9 - by Thomas D.M.	R18	Mac Gibbon's Pictorial Drawing Book for Marine Engineers - by James G. Holburn
R9	Reed's Instrumentation and Control System : Vol.10 - by Jackson, L.	R19	Engineering Drawing for Marine Engineers - by Beck, H.G.
R10	Reed's Motor Engineering Knowledge for Marine Engineers : Vol.12 - by Thomas D.M.	R20	Introduction to Marine Environment Protection - Capt Subroto Khan

Detailed Teaching Syllabus

Subject code	UD11T5206	Block 1 Emergencies
Subject name		Block 2 Communication Skills
		Block 3 Commercial Shipping Knowledge
Emergencies, Maritime Communication and Commercial Shipping Knowledge		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Emergencies	Emergency Drills	1.1	Emergency Drills:	K/U	12	7		
		1.1.1	States That Drills Should Be Carried Out As Follows:					
		1.1.1.1	Routine Exercise Should Be Avoided					
		1.1.1.2	Essential Tasks Should Be Repeated At Each Drill, Including:					
		1.1.1.3	Operation Of Emergency Bilge Pump, Operation Of Remote Shut Of Valves And Remote Stop Switches Checking For Ingress Of Air When Handles Of Fire Flaps Are In 'Closed' Position					
		1.1.1.4	Explain Statutory Requirements For Abandon Ship Drills					
		1.1.1.5	Explain Use Of A Drill Planner.					
		1.1.2	Lists Essential Tasks As:					
		1.1.2.1	Donning Compressed Air Breathing Apparatus (CABA)					
		1.1.2.2	Preparing Hoses And Nozzles					
		1.1.2.3	Checking Foam Compound And Fire Extinguishers					
		1.1.2.4	Checking First Aid Gear					
		1.1.3	States That Emergency Teams Are Assembled In Accordance With The Muster List					
		1.1.4	States That It May Be Necessary To Improvise When Persons Are Absent From Emergency Teams					
		1.1.5	Describes Examples Of Fire Drills As:					
		1.1.5.1	Sending Teams Into Cabins, Lockers, Access Hatches And Machinery Spaces					
		1.1.5.2	Attacking Fires With Appropriate Equipment In Cabins, Lockers, Hatches, Galley And Machinery Spaces					
		1.1.5.3	Evacuating A Wounded Or Unconscious Man From The Above Spaces					
		1.1.5.4	Starting The Emergency Generator					
		1.1.5.5	Starting The Emergency Fire Pump					
		1.2	Describe Examples Of Boat Drills As:	U				
		1.2.1	collecting Additional Survival Gear Using Different Disciplines To Prepare For Launching And To Launch Survival Craft					
		1.3	Precautions When Lowering A Lifeboat	U				
		1.3.1	Explain That Regulations Do Not Require Boat To Be Lowered With Persons Inside.					
		1.3.2	Recommended Procedures For Launching Open And Enclosed Lifeboats; And Free Fall Life-Boats					
		1.3.3	Describe Simulated Launching Of Free-Fall Lifeboats					
		1.3.4	Use Of Fall Preventer Device (Fpd)					
		1.4	LSA And FFA Equipment - Explain Operation, Care And Maintenance - (Life-Boats, Life-Raft, Life-Buoys, Fire Extinguishers, Fire Hose & Nozzles, International Shore Coupling, EEBD)	U				

Detailed Teaching Syllabus

Subject code Subject name		UD11T5206 Emergencies, Maritime Communication and Commercial Shipping Knowledge			Block 1 Emergencies Block 2 Communication Skills Block 3 Commercial Shipping Knowledge				
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Emergencies	Emergency Drills	1.5	State The Importance Of The Following Conventions	K					
		1.5.1	SOLAS						
		1.5.2	Load Line						
		1.5.3	STCW 2010						
		1.6	List The Purpose Of ISM And The Functions Of Flag State Inspection (FSI), Port State Control (PSC)	K					
Communication Skills	International Code Of Signals (INTERCO)	2.1	Knowledge Of The Contents Of The Book "International Code Of Signals"	U	7	2		R1	
		2.2	Recognition Of Flags Denoting Alphabets, Knowledge Of Single Letter Signals	K					
		2.3	Meaning Of Bunting, Halyard, At The Dip, Close Up, Half-Mast, Fly, Tack Line, Courtesy Flag, Ship's Numbers, Jack Flag, Quarantine Flag, Pilot Flag, Blue Peter	U					
		2.4	Location On A Ship Of A Jack Staff, Foremast, Yardarm, Mainmast	U/A					
		2.4.1	What Flags Are Hoisted From These Parts Of Ship And When. Types Of Ensigns. Penalty For Not Using Or Wrongly Using An Ensign.						
	Global Maritime Distress & Safety System (GMDSS)	3.1	Brief Concept Of GMDSS: MSI, Equipment required, Sea Areas, NavAreas/MetAreas	K	8	2		R2	
		3.2	Explain following terms - Distress, Urgency, Safety; Format of Emergency Messages	K					
		3.2.1	Safety						
		3.2.2	Urgency						
		3.2.3	Distress						
Commercial Shipping Knowledge	Maritime Commerce	4.1	Types Of Ports (Natural, Manmade, River, Tidal, Inland, Outer)	K	8			R6, R7, R8, R9, R10, R11, R12, R13, R14	
		4.2	Relationship Between Ship-Owner, Agent, Stevedore, Charterer, Shipper And Broker.	K					
		4.3	Types Of Shipping Trades - Liner, Tramp.	U					
		4.4	Introduction To Articles Of Agreement / Service Contracts/ Indentures For Cadets / Apprentice, Role Of Shipping Master.	K					
	International Institutions	5.1	IMO, ILO, WHO, ISF, IACS, BIMCO, ICS, OCIMF, SIGTTO, Intertanko, Intercargo, IFSMA Etc. And Classification Societies. (Limited To Expanding Of The Abbreviation, Purpose And Function Only)	K					
						35	11	Total 46 Hrs	

Methodology and Reference Books

Subject Code

UD11T5206

Subject Name

Emergencies, Maritime Communication and Commercial Shipping Knowledge

TEACHING METHODOLOGY					
L	Lecture (Hours)	P	Practical (Hours)	D	Demonstration
N	Numerical (Hours)	E	Exercise (Hours)		

Cognitive Levels : **K** - Knowledge **U** - Understanding **A** - Application

REFERENCE BOOKS (R) LIST

R1	International Code of Signals	R8	Introduction to Shipping - by Tutorship, Institute of Chartered Shipbrokers
R2	GMDSS Handbook	R9	Maritime Law - by Christopher Hill
R3	Merchant Ship Construction - by Pursey, H.J.	R10	Shipmaster's Business Companion - by Malcom, Nautical Institute
R4	Ship Stability OOW - by Martin Rhodes	R11	Business and Law for the Mariner - by Ivor Salter
R5	Ship Design and Construction Vol. 1- by Thomas Lamb	R12	Chartering and Shipping Terms - by Lopez Norman
R6	Economic Geography - by Insurance Institute of India	R13	Bills of Lading - by Stephen Mills
R7	Shipping and Mercantile Practices - by Insurance Institute of India	R14	Shipping Practice - by Edward Stevens

Detailed Teaching Syllabus

Subject code Subject name		UD11P5201 Communicative English Lab		Block 1 English Lab (Development of Spoken English Skills) Block 2 IMO SMCP				
BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
English Lab (Development of Spoken English Skills)	Development of skills in Oral Communication	1.1	Phonology: Pronunciation, Work Stress, Intonation, Sentence Stress.			12		
		1.2	Presentation Skills: Content Structuring, Preparation & Planning, Welcome Note, Vote of thanks.					
		1.3	Facing Interview: Attitude, Etiquette, Body Language and Diction.					
		1.4	Sea-Speak Training Manual: External Communication & Internal Communication on Board Ship.					
		1.5	Group Discussion & Extempore Speeches.					
	Book Review	1.6	Read a book and provide a review in minimum 500 words					
IMO Standard Marine Communication Phrases (SMCP)	Standard Marine Communication Phrases	3	Importance of Standard Marine Communication Phrases: Use and understand selected IMO Standard Marine Communication Phrases (listed below) - Procedure, Spelling, Message Markers, Responses, Distress/Urgency/Safety Signals, Corrections, Readiness, Repetition, Number, Position, Bearings Courses, Distances, Speed, Times, Geographical Names, Ambiguous Words (Omission of "may", "might", "should" and "could").			6		
						18	Total 18 Hrs	

Detailed Teaching Syllabus

Subject code	UD11P5202	Block 1 Workshop - Mach Maint, Welding shop, Plumbing shop
Subject name	Workshop Practices & SeamanShip	Block 2 Seamanship - Splicing, Stage Wk, ESE, Corrosion prev
		Block 3 Fire Fighting

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Workshop	Machinery Maintenance	1.1	Identify Various Fasteners Such As Nut And Bolts, Allen Screws, Studs And Demonstrates Its Use.			10	HOLD LADDERS E/R LADDERS PORTABLE EXTENDABLE LADDERS	
		1.2	Identify Valves And Cocks Used Onboard.					
		1.3	Overhaul A Globe Valve And Butterfly Valve By Using Appropriate Tools And Gaskets (Group Activity Of 2-3 Cadets). Safety precautions.					
		1.4	Demonstrate The Procedure To Carry Out Greasing And Oiling Pumps And Motor By Using Grease Gun, Oilcans And Pneumatic Grease Gun.					
	Welding Shop	2.1	Demonstrate The Safety Precautions To Be Observed While Welding Including Earthing. (Instructor Demonstration For A Group Of 20 Cadets).			7		
		2.2	Identify The Arc And Gas Welding Tools And Welding Kits.					
		2.3	Identify Ferrous And Non-Ferrous Metals.					
		2.4	Demonstrates The Ability To Carry Out Oxyacetylene Gas Cutting. (Group Activity Of 4-5 Cadets). Safety precautions.					
		2.5	Connects The Arc Welding Kit And Selects The Current / Electrode To Carry Out Arc Welding.(Group Activity Of 4-5 Cadets). Safety precautions.					
		2.6	Demonstrate The Ability To Carry Out Arc Bead Welding.(Group Activity Of 4-5 Cadets). Safety precautions.					
	Plumbing Shop	3.1	Identify Plumbing Hand Tools Such As Pipe Wrench, Dies, Pipe Benders, Hacksaw, Pipe Vice, Spanners, Etc. (Ship Specific).			12		
		3.2	Identify Leak Stopping Material Such As Teflon, Sealant, Jubilee Clips, Ermeto Couplings. And Demonstrate Their Use.					
		3.3	Demonstrate The Procedures To Cut Threads On Pipes By Selecting Appropriate Die.(Group Activity Of 2-3 Cadets). Safety precautions.					
		3.4	Demonstrate The Ability To Identify Different Pipes, Pipe Material And Methods To Join The Pipes.					
		3.5	Identify Various Taps, Cocks And Valves Used In Sanitary System, Demonstrate Ability To Repair Them (Ship Specific).					
		3.6	Identify Various Plumbing Accessories Such As 'T' Joint, Socket, Reducer, Adapter, Etc. Used In Pipe Fitting And Demonstrate Its Use.					
		3.7	Cut The Gasket As Per Sketch By Selecting Appropriate Material And Tools. Safety precautions.					
		3.8	Demonstrate The Ability To Clear Choked Pipes In Accommodation Plumbing System By Using Appropriate Tool / Choke Clearing Material.					

Detailed Teaching Syllabus

Subject code	UD11P5202	Block 1 Workshop - Mach Maint, Welding shop, Plumbing shop
Subject name		Block 2 Seamanship - Splicing, Stage Wk, ESE, Corrosion prev
		Block 3 Fire Fighting

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Seamanship	Splicing Of Fibre Rope & Wire Ropes	4.1	Fibre Ropes			10		
		4.1.1	Eye Splice					
		4.1.2	Back Splice					
		4.2	Wire Ropes					
		4.2.1	Eye Splice (Group Activity Of 2-3 Cadets)					
		4.2.2	Demonstrate The Use Of Bulldog Grips And Bottle Screws / Turnbuckles In Joining Wires.					
		4.2.3	Demonstrate Coiling And Uncoiling Wire Ropes And Removing Kinks (Group Activity Of 2-3 Cadets).					
	Stage, Bosun's Chair, Mast Work	5.1	Safety Procedure Involved In Working Aloft On Stage And A Bosun's Chair (Group Activity Of 2-3 Cadets)			7		
		5.2	Demonstrate The Ability To Climb A Ship's Mast					
		5.3	Demonstrate Ability In Climbing Pilot Ladder.					
		5.4	Demonstrate Ability To Climb Down Stairs In Accommodation And Ladders. Show The Procedure To Carry Objects Up Or Down The Ladders Or Stairs.					
	Enclosed Spaces	6.1	Gas Measuring Equipment- Explosimeter, O2 Analyzer			5		
		6.2	Demonstrate Entering Enclosed Spaces With Atmospheres Suspected To Be Unsafe For Entry- Donning Scba, Permit Systems And Adequate Safe Working Practices. (Group Activity Of 4-5 Cadets).					
	Corrosion Prevention	7.1	Demonstrate Understanding Of Importance Of 'Surface Preparation Methods' Required Prior Painting A Surface			10		
		7.2	Demonstrate The Proper Use Of Following Electric And Pneumatic Machines For Surface Preparation Needle Guns, Chipping Machines, Angle Grinders, Rustibus					
		7.3	Demonstrate The Understanding Of Maintenance Routines Of Above Equipments					
		7.4	Demonstrate How 'Wet' And 'Dry' Film Thickness Can Be Measured After Painting A Surface					
		7.5	Explain The Difference In Results After Painting A Surface Using A Brush, A Roller And Using A Sparay Machine					
		7.6	Demonstrate The Use Of A 'Paint Spray Machine' To Paint A Given Surface After Taking All Due Precautions					
		7.7	Stencilling					

Detailed Teaching Syllabus

Subject code	UD11P5202	Block 1 Workshop - Mach Maint, Welding shop, Plumbing shop
Subject name	Workshop Practices & SeamanShip	Block 2 Seamanship - Splicing, Stage Wk, ESE, Corrosion prev
		Block 3 Fire Fighting

Note: The cadet must be briefed regarding the safety precautions to be taken and reason for same before doing any practical task. The cadet/s must be monitored closely throughout the practical exercise to ensure that all safe practices are being followed. Use of MCA publication "Code of SafeWorking practices for Merchant Seamen" is to be encouraged.

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES
Fire Fighting	Fire Fighting	8.1	Learn To Refill Foam And Dcp Types Portable Fire Extinguishers Whichwere Discharged During A Drill			6		
		8.2	Learn To Operate The Scba Compressor And Refill The Air Bottles Which Were Used Up When Scba Was Being Used During A Drill					
		8.3	Learn To Do Pressure Testing Of Fire Hoses By Attaching To A Hydrant					
		8.4	Learn To Attach Couplings To Fire Hose Ends Using Copper Siezing Wires					
						67	Total 67 Hrs	

Note: All the practical tasks mentioned are to be done individually unless stated otherwise

Detailed Teaching Syllabus

Subject code	UD11P5203	Block 1 Altitude & Azimuth
Subject name		Block 2 Bridge Equipment & Watch-keeping
Navigation Laboratory		

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Altitude & Azimuth	Celestial Observation	1.1	Demonstrate Taking Altitude Of Celestial Bodies Using Sextant.	A		2	D	Marine Sextant	
		1.2	Carry Out Boxing Of Compass.	A		2	D		
		1.3	Demonstrate Use Of Azimuth Mirror In A Binnacle/ Repeater For Taking Compass Bearings.	A		1	D	Azimuth Ring	
Bridge Equipment & Watch-keeping	(ColRegs)	2.1	Demonstrate, With The Use Of Models The Proper Signals Or Lights And The Proper Action To Be Taken To Avoid Collision.	A		4	D		
	(Lookout & Steering)	2.2	OOW Simulator required (as per applicable DGS guidelines)	A				OOW Simulator as per DGS specs	
		2.2.1	Simulator- Demonstrate The Ways To Carry Out Lookout Duties & Helmsman Duties (include changing steering motors and modes of steering)	A		2	D		
		2.2.2	Equipment familiarisation - GPS, Echo sounder and Course recorder, Radar	A		4	D		
	(Watch-keeping)	2.2.3	Bridge Watch-keeping exercise - Log-book writing, Fixing of Ship's Position By Crossing Bearings And Distances Of Radar Conspicuous Terrestrial Objects), Recording Weather observations by Hygrometer, Psychrometer, Barometer, Anemometer			2			
		2.2.4	Demonstrate Closed Loop Communication Using Vhf/ Walkie Talkies.			1			
	ECDIS	2.3	ECDIS Simulator	A					
		2.3.1	Set up the ECDIS display as per following list -		A		1	D	(Institutes to provide 1 ECDIS station per 4 student in Navigation Lab)
			- Four modes of Display (Base, Standard, ALL, Custom) (Reference to MSC 232.82)		A				
			- Understand Scale of an ENC and equivalence with Radar range scales		A				
			- N/UP, C/UP, H/UP display modes		A				
			- Centred / Off-centred display		A				
			- TM/RM display modes		A				
			- Day / Night modes		A				
- 2 or 4 color display			A						
- Explain Overscale Issue on display			A						
- Setting active ENC to compilation scale			A						
- Controls such as Auto-load, Auto-scale, Auto-centre, Home (Centre-ship) command		A							
2.3.2	Apply Safety settings in ECDIS		A		1	D			
	- Calculate & feed Safety Depth		A						
	- Calculate & feed Safety Contour		A						
	- Calculate & feed Safety Height		A						
	- Calculate & feed Shallow contour and Deep contour		A						

Detailed Teaching Syllabus

Subject code	UD11P5203	Block 1 Altitude & Azimuth
Subject name	Navigation Laboratory	Block 2 Bridge Equipment & Watch-keeping

BLOCK	GENERAL LEARNING OBJECTIVES (TRAINING AREA)	UNIT. NO.	SPECIFIC LEARNING OBJECTIVES (TOPICS)	COGNITIVE LEVEL	THEORY	PRACTICE / EXERCISE	REINFORCEMENT	RESOURCES	
Bridge Equipment & Watch-keeping	ECDIS	2.3.3	Apply Ownship settings in ECDIS	A		1	D		
			- Feed vessel details in ECDIS such as Vessel Name, LOA, Breadth, Draft, etc	A					
			- Select Vector type and Vector length	A					
			- Select time-zone, source of UTC time	A					
		2.3.4	Sensor Management settings in ECDIS	A		1	D		
			- Select / Change sensors for Position, Heading and Speed inputs	A					
		2.3.5	Create a Simple Route in ECDIS between 2 positions (not more than 5 legs) and adjust (feed) following parameters for each leg independently -	A		2	D		
			- XTE port & starboard	A					
			- Radius of turn, Rate of Turn & Leg speed	A					
			- Leg type (RL or GC)	A					
		2.3.6	Perform following Route functions –	A			3	D	
			- Check route for Safety in ECDIS	A					
			- Obtain pick-report (Query S57 object) to get more details	A					
			- Check Quality of Data along route (CATZOC function)	A					
			- Activate route	A					
			- Edit route	A					
			- Save or Delete Route	A					
			- Load & Unload Route	A					
		2.3.7	Apply following alarm settings in ECDIS	A			1	D	
			- Guard zone or safety frame or sector,	A					
	- activate-deactivate different types of area alerts,	A							
	- activate-deactivate route alarms (XTE alarm, Wpt approach alarm, Early course change or wheelover alarm, End of route alarm)	A							
	- Setting of route alarms	A							
2.3.8	Perform following User map (User object) functions –	A			2				
	- Create or Insert various types of user objects (point objects, line objects, area objects)	A							
	- Write text (Annotate function) on ENC using the tool provided for same	A							
	- Plot or verify ship's position by LOP tool	A							
	- Assign alarm to user objects	A							
						30 Hours			

SEMESTER-II
Question Paper
Templates

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Semester II

NAV III – Navigation & Chartwork
Subject Code: UD11T5201

Max. Marks: 70

Pass Marks: 35

Date :

Time: 3 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

1. Use BA Chart 2675 or INT 5049 (English Channel) for Chart work
 2. Use of selected pages of Nautical Almanac 2008, Norie's Tables and Non-programmable type Scientific Calculator is permitted in the Exam Hall.
 3. Exam Centres to provide 'Luminous Range Diagram' and 'Tide Curve Diagram' (from ATT 3) to candidates (if required)
 4. Draw Sketches wherever required
-

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
 - a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. Unit 3.02 (Numerical) (10 Marks)
4. Unit 3.03 (Numerical) (10 Marks)
5. (2 x 5 = 10 Marks)
 - a) Unit 3.01 (Numerical)
 - b) Unit 4.01 to 4.05 (Theory)
6. Unit 4.19 – 4.20 (Numerical) (10 Marks)
7. Unit 4.22 – 4.23 (Numerical) (10 Marks)

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8. (2 x 5 = 10 Marks)
- a) Unit 5 (Theory / Numerical)
 - b) Unit 6.01 – 6.02 (Theory)
9. (2 x 5 = 10 Marks)
- a) Unit 6.03 to 6.08 (Theory)
 - b) Unit 2 (Theory)

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Semester II

Advanced Bridge Equipment, Watchkeeping & Meteorology
Subject Code: UD11T5202

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1
 - b) Unit 2
4. (2 x 5 = 10 Marks)
- a) Unit 1
 - b) Unit 7
5. (2 x 5 = 10 Marks)
- a) Unit 1
 - b) Unit 9 - 10

Note : Different topics to be covered under Q3a, Q4a & Q5a

6. (2 x 5 = 10 Marks)
- a) Unit 5
 - b) Unit 8

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7. (2 x 5 = 10 Marks)
a) Unit 6
b) Unit 8

Note : Different topics to be covered under Q6b & Q7b

8. (2 x 5 = 10 Marks)
a) Unit 3
b) Unit 2

9. (2 x 5 = 10 Marks)
a) Unit 3
b) Unit 4

Note : Different topics to be covered under Q8a & Q9a

-----End of question paper-----

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Cargo Handling, Stowage & Seamanship II
Subject Code: UD11T5203

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Draw sketches wherever required

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1
 - b) Unit 5
4. (2 x 5 = 10 Marks)
- a) Unit 1 (different from 3a)
 - b) Unit 6
5. (2 x 5 = 10 Marks)
- a) Unit 2
 - b) Unit 6 (different from 4b)
6. (2 x 5 = 10 Marks)
- a) Unit 4
 - b) Unit 7

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7. (2 x 5 = 10 Marks)
- a) Unit 3
 - b) Unit 7 (different from 6b)
8. (2 x 5 = 10 Marks)
- a) Unit 3 (different from 7a)
 - b) Unit 4 (different from 6a)
9. (2 x 5 = 10 Marks)
- a) Unit 3 (different from 7a & 8a)
 - b) Unit 2 (different from 5a)

-----End of question paper-----

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Semester II

Ship Construction and Stability - II
Subject Code: UD11T5204

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Use of Non-programmable Scientific Calculator & M.V. Hindship Stability
Particulars booklet are permitted.

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. Unit 5.3.2 (Numerical) (10 Marks)
4. Unit 5.1.6 (Numerical) (10 Marks)
5. (2 x 5 = 10 Marks)
- a) Unit 4 (Numerical)
 - b) Unit 4 (Theory)
6. Unit 1.1 to 1.4 (Profile view sketch) (10 Marks)
7. (2 x 5 = 10 Marks)
- a) Unit 1.5
 - b) Unit 2

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8. (2 x 5 = 10 Marks)
- a) Unit 3
 - b) Unit 4 (Numerical) (different from 5a)
9. (2 x 5 = 10 Marks)
- a) Unit 1.6 to 1.10
 - b) Unit 3 (different from 8a)

-----End of question paper-----

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Semester II

Marpol & Marine Engineering Knowledge
Subject Code: UD11T5205

Max. Marks: 70

Pass Marks: 35

Date :

Time: 2 hours

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1.2
 - b) Unit 1.1
4. (2 x 5 = 10 Marks)
- a) Unit 1.3
 - b) Unit 2.1 to 2.3
5. (2 x 5 = 10 Marks)
- a) Unit 1.4
 - b) Unit 3.1 to 3.3
6. (2 x 5 = 10 Marks)
- a) Unit 1.5
 - b) Unit 3.4

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7. (2 x 5 = 10 Marks)
- a) Unit 1.6
 - b) Unit 3.5 to 3.7
8. (2 x 5 = 10 Marks)
- a) Unit 1.7
 - b) Unit 3.8 – 3.9
9. (2 x 5 = 10 Marks)
- a) Unit 1.8 – 1.9
 - b) Unit 3.10 to 3.16

-----End of question paper-----

INDIAN MARITIME UNIVERSITY
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Semester II

Emergencies, Maritime Communication and Maritime Commerce
Subject Code: UD11T5206

Max. Marks: 70

Date :

Note: Section A (20 Marks) – Q1 & Q2 are compulsory

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Pass Marks: 35

Time: 2 hours

Section – A

1. MCQ / Fill in the blanks / True or False – covering entire syllabus (1 x 10 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)
 - f)
 - g)
 - h)
 - i)
 - j)
2. Short Answer Questions - covering entire syllabus (2 x 5 = 10 Marks)
- a)
 - b)
 - c)
 - d)
 - e)

Section – B

3. (2 x 5 = 10 Marks)
- a) Unit 1.1
 - b) Unit 1.1 (different from 1a)
4. (2 x 5 = 10 Marks)
- a) Unit 1.2
 - b) Unit 1.3
5. (2 x 5 = 10 Marks)
- a) Unit 1.4
 - b) Unit 1.5
6. (2 x 5 = 10 Marks)
- a) Unit 1.6
 - b) Unit 1.4 (different from 5a)

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7. (2 x 5 = 10 Marks)
- a) Unit 2
 - b) Unit 4
8. (2 x 5 = 10 Marks)
- a) Unit 3.1
 - b) Unit 4 (different from 7b)
9. (2 x 5 = 10 Marks)
- a) Unit 3.2
 - b) Unit 5.1

-----End of question paper-----

ACKNOWLEDGEMENT

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