

Regulation 2023

Program Structure

1027 Diploma in Marine Engineering

Program Outcomes (PO's)

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude, and behavior that students acquire through the program.

The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering diploma graduate.

NBA has defined the following seven POs for an Engineering diploma graduate:

PO1: Basic and Discipline-specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and an engineering specialization to solve the engineering problems.

PO2: Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation, and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment: Apply appropriate technology in the context of society, sustainability, environment and ethical practices.

PO6: Project Management: Use engineering management principles individually, as a team member or as a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

Credit Distribution

Semester	No of Courses	Periods	Credits
Semester I	8	640	20
Semester II	9	640	20
Semester III	8	640	21
Semester IV	7	640	19
Semester V	8	635 [#]	22
Semester VI	3	660	18
Total			120

Industrial Training during summer vacation for Two Weeks has to be completed to earn the required two credits.

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING

Semester I								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Humanities & Social Science	Theory	1000231110	Tamil Marabu	2-0-0	30	2	Theory
2	Basic Science	Theory	1000231230	Basic Mathematics	3-1-0	60	4	Theory
3	Basic Science	Practicum	1000231330	Basic Physics	2-0-2	60	3	Theory
4	Basic Science	Practicum	1000231430	Basic Chemistry	2-0-2	60	3	Theory
5	Engineering Science	Practicum	1000231520	Digital Workplace Skills	0-0-4	60	2	Practical
6	Humanities & Social Science	Practicum	1000231640	Communicative English - I	1-0-2	45	2	Practical
7	Engineering Science	Practicum	1000231740	Basic Workshop Practices	1-0-2	45	2	Practical
8	Open Elective	Advanced Skill Certification	1000231860	Basic English for Employability	0-0-4	60	2	Practical
9	Humanities & Social Science	Integrated Learning Experience	1000231880	Growth Lab	-	15	0	-
10	Audit Course	Integrated Learning Experience	1000231881	Induction Program – I	-	40	0	-
11	Audit Course	Integrated Learning Experience	1000231882	I&E/ Club Activity/ Community Initiatives	-	30	0	-
12	Audit Course	Integrated Learning Experience	1000231883	Shop floor Immersion	-	8	0	-
13	Audit Course	Integrated Learning Experience	1000231884	Student-Led Initiative	-	22	0	-
14	Audit Course	Integrated Learning Experience	1000231886	Health & Wellness	-	30	0	-
Test & Revisions						60		
Library						15		
Total						640	20	

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING

Semester II								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Humanities & Social Science	Theory	1000232110	Tamils and Technology	2-0-0	30	2	Theory
2	Program Core	Theory	1027232210	Basics of Marine Engineering	3-0-0	45	3	Theory
3	Engineering Science	Lab	1000232320	Drafting Practices	0-0-4	60	2	Practical
4	Basic Science	Practicum	1000232440	Applied Mathematics – I	1-0-4	75	3	Practical
5	Basic Science	Practicum	1000232540	Applied Physics – I	1-0-2	45	2	Practical
6	Basic Science	Practicum	1000232640	Applied Chemistry – I	1-0-2	45	2	Practical
7	Engineering Science	Practicum	1000232740	Basic Engineering Practices	1-0-2	45	2	Practical
8	Humanities & Social Science	Practicum	1000232840	Communicative English – II	1-0-2	45	2	Practical
9	Open Elective	Advanced Skill Certification	1000232860	Advanced Skills Certification – II	1-0-2	45	2	NA
10	Humanities & Social Science	Integrated Learning Experience	1000232880	Growth Lab	-	30	0	-
11	Audit Course	Integrated Learning Experience	1000232882	I&E/ Club Activity/ Community Initiatives	-	30	0	-
12	Audit Course	Integrated Learning Experience	1000232883	Shop floor Immersion	-	8	0	-
13	Audit Course	Integrated Learning Experience	1000232884	Student-Led Initiative	-	24	0	-
14	Audit Course	Integrated Learning Experience	1000232885	Emerging Technology Seminars	-	8	0	-
15	Audit Course	Integrated Learning Experience	1000232886	Health & Wellness	-	30	0	-
Test & Revisions						60		
Library						15		
Total						640	20	

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING

Semester III								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	1027233110	Ship Construction Technology	3-0-0	45	3	Theory
2	Program Core	Practicum	1027233230	Marine Workshop Technology – I	3-0-2	75	4	Theory
3	Program Core	Practical/Lab	1027233320	Ship Construction Technology Practical – I	0-0-4	60	2	Practical
4	Program Core	Practicum	1020233440	Industrial drives and control	1-0-4	75	3	Practical
5	Program Core	Practicum	1027233540	Marine Strength of Materials and Fluid Mechanics	1-0-4	75	3	Practical
6	Program Core	Practicum	1027233640	Marine Workshop Practice – I	1-0-4	75	3	Practical
7	Open Elective	Advanced Skill Certification	1027233760	Advanced Skills Certification – III	1-0-2	60	2	NA
8	Humanities & Social Science	Integrated Learning Experience	1027233880	Growth Lab	-	30	0	-
9	Audit Course	Integrated Learning Experience	1027233881	Induction Program – II	-	16	0	-
10	Audit Course	Integrated Learning Experience	1027233882	I&E/ Club Activity/ Community Initiatives	-	16	0	-
11	Audit Course	Integrated Learning Experience	1027233883	Shop floor Immersion	-	8	0	-
12	Audit Course	Integrated Learning Experience	1027233884	Student-Led Initiative	-	22	0	-
13	Audit Course	Integrated Learning Experience	1027233885	Emerging Technology Seminars	-	8	0	-
14	Audit Course	Integrated Learning Experience	1027233886	Health & Wellness	0-0-2	30	1	NA
Test & Revisions						30		
Library						15		
Total						640	21	

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING

Semester IV								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	1027234110	Marine Diesel Engine and Power Plant	3-0-0	45	3	Theory
2	Program Core	Practicum	1027234230	Marine Workshop Technology – II	2-0-2	60	3	Theory
3	Program Core	Practical/Lab	1027234320	Ship Construction Technology Practical – II	0-0-4	60	2	Practical
4	Program Core	Practicum	1027234440	Marine Engine Mechanism	1-0-4	75	3	Practical
5	Program Core	Practicum	1027234540	Seamanship and Life Saving Appliances	1-0-4	75	3	Practical
6	Program Core	Practicum	1027234640	Marine Workshop Practice – II	1-0-4	75	3	Practical
7	Open Elective	Advanced Skill Certification	1027234760	Advanced Skills Certification – IV	1-0-2	60	2	NA
8	Audit Course	Integrated Learning Experience	1027234882	I&E/ Club Activity/ Community Initiatives	-	30	0	-
9	Audit Course	Integrated Learning Experience	1027234883	Shop floor Immersion	-	8	0	-
10	Audit Course	Integrated Learning Experience	1027234884	Student-Led Initiative	-	24	0	-
11	Audit Course	Integrated Learning Experience	1027234885	Emerging Technology Seminars	-	8	0	-
12	Audit Course	Integrated Learning Experience	1027234886	Health & Wellness	-	30	0	-
13	Audit Course	Integrated Learning Experience	1027234887	Special Interest Groups (Placement Training)	-	30	0	-
Test & Revision						30		
Library						30		
Total						640	19	

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING

Semester V								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Core	Theory	1027235110	First Aid and Fire Safety	3-0-0	45	3	Theory
2	Program Core	Practicum	1027235230	Marine Auxiliary Machinery	3-0-2	75	4	Theory
3	Program Elective	Practicum		Elective – 1	2-0-2	60	3	Theory
4	Program Core	Practicum	1027235440	Fire Fighting	1-0-4	75	3	Practical
5	Program Elective	Practicum		Elective – 2	1-0-4	75	3	Practical
6	Humanities & Social Science	Practicum	1027235654	Marine Innovation & Startup	1-0-2	45	2	Project
7	Project/Internship	Project/Internship	1027235773	Industrial Training [Summer Vacation - 90 Hours]	-	-	2	Project
8	Open Elective	Advanced Skill Certification	1027235860	Advanced Skills Certification - V	1-0-2	60	2	NA
9	Audit Course	Integrated Learning Experience	1027235981	Induction program – III	-	40	0	-
10	Audit Course	Integrated Learning Experience	1027235984	Student-Led Initiative	-	30	0	-
11	Audit Course	Integrated Learning Experience	1027235986	Health & Wellness	-	30	0	-
12	Audit Course	Integrated Learning Experience	1027235987	Special Interest Groups (Placement Training)	-	40	0	-
Test & Revision						45		
Library						15		
Total						635	22	

**GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING**

Semester VI								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Open Elective	Theory		Electives – 3 (Pathway)	3-0-0	45	3	Theory
2	Open Elective	Practicum		Elective – 4 (Specialisation)	1-0-4	75	3	Practical
3	Industrial Training / Project	Project/Internship		In-house Project / Internship / Fellowship **	-	540	12	Project
Total						660	18	
3	Industrial Training / Project	Project/Internship	1027236351	Internship	-	540	12	Project
3	Industrial Training / Project	Project/Internship	1027236353	Fellowship	-	540	12	Project
3	Industrial Training / Project	Project/Internship	1027236374	In-house Project	-	540	12	Project

Note: ** Every student should select any one from the In-House Project or Internship or Fellowship. The guidelines given have to be followed.

**GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING**

Elective - I								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Practicum	1027235331	Marine Engineering Drawing	2-0-2	60	3	Theory
2	Program Elective	Practicum	1027235332	Personal Safety and Social Responsibilities	2-0-2	60	3	Theory
3	Program Elective	Practicum	1027235333	Rule of the Road	2-0-2	60	3	Theory
4	Program Elective	Practicum		Inter discipline course #	2-0-2	60	3	Theory
# Courses from other programmes with the same credit can be considered after proper approval from the Chairman Board of Examinations.								
Elective - II								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Program Elective	Practicum	1027235541	Ship Machinery	1-0-4	75	3	Practical
3	Program Elective	Practicum	1027235542	Computer Aided Marine Engineering Drawing	1-0-4	75	3	Practical
3	Program Elective	Practicum	1027235543	Navigational and Meteorological Instruments	1-0-4	75	3	Practical

**GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
DIPLOMA IN ENGINEERING & TECHNOLOGY - REGULATION 2023
1027 DIPLOMA IN MARINE ENGINEERING**

Elective – III (Pathway)								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Elective Higher Education	Theory	1027236111	Naval Architecture	3-0-0	45	3	Theory
2	Elective Entrepreneurship	Theory	1027236112	Shipping Practice	3-0-0	45	3	Theory
3	Elective Technocrats	Theory	1027236113	Navigation	3-0-0	45	3	Theory
4	Elective Open Elective	Theory		Online Elective Courses \$	3-0-0	45	3	Theory
<p>\$ Online courses with the same credit available in AICTE, SWAYAM, NPTEL and reputed Institutions with the proper evaluation system and certification can be considered after proper approval from the Chairman Board of Examinations.</p>								
Elective – IV (Specialization)								
#	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Elective	Practicum	1027236241	Personal Survival Techniques	1-0-4	75	3	Practical
3	Elective	Practicum	1027236242	Fishing Technology	1-0-4	75	3	Practical
3	Elective	Practicum	1027236243	Marine Welding Technology	1-0-4	75	3	Practical

III SEMESTER



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023

1027233110	SHIP CONSTRUCTION TECHNOLOGY	L	T	P	C
Theory		3	0	0	3

Introduction:

In the field of shipping and marine engineering, ship construction has an important place because latest technology is being employed in the field of construction and repair of ships. The knowledge of shipping terms, hull construction, hull dynamics and launching is required for the marine engineer.

Course objectives:

The objective of this course is to enable the student to

- Understand the ship terms, movement of ships and the various materials used in ship building.
- Acquire knowledge about different types of ships.
- Acquire broader ideas about shell & deck plating and stresses acting on the hull.
- Understand about hull dynamics and paintings.
- To study bulkheads, water tight doors, deep tanks and hatches.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Gather knowledge about the general terms used.
- CO2: Understand ship framing.
- CO3: Know the fore and aft arrangement.
- CO4: Interpret the maneuvering and propulsion of ships.
- CO5: Comprehend about ship maintenance.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	2	3	2	3
CO2	3	1	3	2	1	3	2
CO3	3	2	3	3	2	1	1
CO4	3	2	2	3	1	1	2
CO5	3	2	1	2	3	2	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus content

1027233110	SHIP CONSTRUCTION TECHNOLOGY	L	T	P	C
Theory		3	0	0	3
Unit I	General terms in use				
Forward – Aft - port side – starboard side – draught - draught moulded – freeboard – depth - moulded depth – Length overall – forward perpendicular – aft perpendicular - length between perpendiculars – camber - tumble home – bilge radius – sheer. Hogging, sagging, racking, water pressure, panting and pounding.					9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

Unit II	Ship framing	
	Shell plating – keel strake – garboard strake – shear strake. Deck plating Single bottom – Double bottom – Double bottom tank – internal structure of double bottom tank – duct keel – double bottom in machinery space.	9
Unit III	Fore and aft arrangement	
	Water tight bulkheads – water tight doors – corrugated bulkheads – collision bulkhead. Stem plating – bulbous bow – anchor and cable arrangement Stern frame – Cruiser stern – transom stern – shaft tunnel – stern tube.	9
Unit IV	Ship dynamics	
	Rudder – use of rudder – types of rudder – unbalanced rudder – balanced rudder – semi balanced rudder. Propellers – fixed pitch propeller – controllable pitch propeller – contra rotating propellers – vertical axis propellers – bow thrusters – stern thruster.	9
Unit V	Ship maintenance	
	Corrosion – prevention of hull corrosion. Surface preparation – weathering - pickling – flame cleaning – shot blasting – painting. Hull maintenance: Cathodic protection – impressed current system – fouling – anti fouling paints. Pipe line maintenance: Marine growth preventing system – chemical dosing system.	9
TOTAL HOURS		45

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of charts mentioning the general terms.
- Practice ship framing on models.
- Bulkhead and door models may be prepared in MS sheets.
- Maneuvering and propulsion may be taken as project.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Students may be asked to present seminar.

Reference:

- Reeds ship construction – E.A. Stroke.
- Ship construction – Edrich Fernands, Pro-Navigator books
- Notes on ship construction – Capt. Dara E. Driver, Rumar Publications.

Web-based/online resources:

- <https://www.maritimeknowledge.in>
- <https://oceanstechnology.co.uk>
- <https://www.academia.edu>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027233230	MARINE WORKSHOP TECHNOLOGY - I	L	T	P	C
Practicum		3	0	2	4

Introduction:

Different materials go into the making of a ship. Cast iron is one of the major materials uses in manufacturing ships. Many parts of ships are cast in foundry. Parts of ships are joined by welding. Different types of welding methods are used in ships. Lathes are used in ships for different purposes.

Course objectives:

The objective of this course is to enable the student to

- Know the various types of moulds and preparation of casting.
- Have knowledge on Welding & heat treatments.
- Know various operations that can be performed in lathe and allied machines
- To equip with the practical knowledge required in the core industries.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the patterns and casting.
- CO2: Know the materials used for moulding.
- CO3: Understand different types of welding.
- CO4: Study the new welding methods.
- CO5: Have an idea about the different operations on lathe.



Pre-requisites:

Knowledge of basic science.

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	3	3	2	2
CO2	2	1	3	2	3	2	1
CO3	3	3	2	3	3	1	2
CO4	2	2	1	2	3	2	3
CO5	2	1	3	3	2	1	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Any Two Units)	Written Test Theory (Another Two Units)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2, Assessment written test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should answer Five questions.

Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim / Apparatus required	10
B	Procedure / Observation	15
C	Performance / Work	25
D	Result / Output	10
E	Practical document (All Practicals)	30
F	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.



10.
11.
12.
IV. 13.
14.
15.
16.
V. 17.
18.
19.
20.

Syllabus Contents

1027233230		MARINE WORKSHOP			
Practicum		L	T	P	C
		3	0	2	4
Unit I	FOUNDRY				
Theory					9
<p>PATTERNS: Definition – pattern materials – factors for selecting pattern materials – single piece solid, split patterns – pattern allowances – core prints.</p> <p>CASTING: Definition – sand casting using green sand and dry sand – gravity die casting – pressure die-casting – hot and cold chamber processes – defects in casting – causes and remedies – safety practices in foundry.</p>					
Practical					6
Ex.1. Demonstration of solid pattern.					
Unit II	MOULDING				
Theory					9
<p>Definition – moulding boxes, moulding sand – ingredients – silica – clay – moisture and miscellaneous materials – properties of moulding sand – sand additives – moulding sand preparation – mixing – tempering and conditioning – types of moulding – green sand – dry sand – core – CO₂ process core making – types of core – core boxes.</p>					
Practical					6
Ex.2. Demonstration of materials used for preparation of mould.					
Unit III	WELDING				



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Theory		
Welding – arc welding — carbon arc – metal arc – metal inert gas (MIG) – tungsten inert gas (TIG) – submerged arc and Electro slag welding – Inspection and testing of welded joints – destructive and non-destructive tests – magnetic particle test – radiographic and ultrasonic test		9
Practical		
Ex.3. Demonstration of materials used for arc welding.		6
Unit IV	NEWER WELDING	
Theory		
Electron beam welding – laser beam welding – resistance welding - spot welding, Gas welding – oxy-acetylene welding – three types of flames. Defects in welding – causes and remedies – safety practices in welding.		9
Practical		
Ex.4. Demonstration of spot welding. Ex.5. Demonstration of materials used for gas welding.		6
Unit V	LATHE	
Theory		
Types of lathes – specifications – parts of Lathe – head stock – back geared type – all geared type – tumbler gear mechanism – machining operations done on lathe – plain turning – step turning – taper turning – knurling – thread cutting – facing – boring – chamfering – cutting speed – feed – depth of cut.		9
Practical		
Ex.6. Demonstration of lathe.		6
TOTAL HOURS		75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Try different patterns and casting methods.
- Practice moulding.
- Find out the defects in welding.
- Practice different welding methods.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Arrange seminar for students on related topics.

Reference:

- Elements of workshop Technology By S.K Hajra Choudhury , A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd.
- A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi.
- A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications (P) Ltd.
- A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications (P) Ltd.

Web-based/online resources:

- <https://www.reliance-foundry.com>
- <https://www.twi-global.com/>
- https://www.nakamura-tome.com/machine_articles/about-lathe/

LIST OF EQUIPMENTS (for a batch of 30 students)

Centre lathe		- 06
Foundry		
1.	Pattern (each)	- 07
2.	Moulding box (16” x 16” x 4”)	- 15
3.	Runner	- 15
4.	Riser	- 15
5.	Shawel	- 05
6.	Gate cutter	- 15
7.	Spirit level	- 02
8.	plastic bucket	- 05
9.	moulding sand	- 500kg
10.	Rammer	- 15
11.	vent rod	- 15



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

12	Draws spike	- 15
13	mallet small size	- 05
14	Bellows	- 03

Welding

1	300 Amps welding transformer with accessories	- 01
2	oxy – acetylene gas welding set with accessories	- 01
3	Spot welding m/c with accessories	- 01

1027233320	SHIP CONSTRUCTION TECHNOLOGY PRACTICAL - I	L	T	P	C
Practical/Lab		0	0	4	2

Introduction:

Ship construction is a major industry with great opportunities and challenges. Ships are constructed and repaired at shipyards. Parts of ships are constructed and assembled at the shipyards. Different types of materials are being used for the construction of different parts of ships. Parts are joined mainly by welding.

Course objectives:

The objective of this course is to enable the student to

- Learn about ship construction.
- Study parts of ships.
- Familiarise the tools and equipments.
- Prepare different sections of ships by welding.

Course outcomes:

On successful completion of this course, the student will be able to

CO1: Study about the types of ships.

CO2: Know the machineries used in ships.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- CO3: Understand the different parts of the ship.
 CO4: Summarise the construction of ships.
 CO5: Have an idea about the activities in shipyards.

Pre-requisites:

Knowledge of basic science.

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	3	2	2	1	3
CO2	2	3	3	2	2	3	2
CO3	2	1	3	2	1	2	3
CO4	3	3	3	2	1	3	3
CO5	3	1	2	2	3	3	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- Fabrication of parts should be done with mild steel sheets.
- Joining of sheets should be done by welding.
- The experiments given in this subject are to be done by a group of students.
- The group may consist of a maximum of six students.
- Each group should complete all the experiments given in the syllabus.
- All precautionary measures should be taken while doing the experiments.
- Students should wear safety shoes.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle / 50 % Exercises	Second Cycle / Another 50 % Exercises	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	Each Practical 10 Marks	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Internal Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. Ship parts should be made of chart paper. The given experiment / part of the ship should be completed by the student individually in the examination. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & Tools required	5
B	Preparation / Procedure	20



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

C	Cutting/ Joining	15
D	Finish / Output	10
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate
- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. Ship parts should be made of mild steel sheets. The given experiment / part of the ship should be completed by the student individually in the examination. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Tools required	10
B	Preparation / Procedure	20
C	Cutting/ Joining	20
D	Welding	20
E	Finish / Output	20



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

F	Viva Voce	10
TOTAL		100

Syllabus Content

1027233320	SHIP CONSTRUCTION TECHNOLOGY	L	T	P	C
Practical/Lab	PRACTICAL - I	0	0	4	2
Ex No: 01 Fabrication of keel part. Ex No: 02 Fabrication of fore part. Ex No: 03 Fabrication of after part. Ex No: 04 Fabrication of bulkheads. Ex No: 05 Fabrication of transverse framing. Ex No: 06 Fabrication of hatches. Ex No: 07 Fabrication of mast. Ex No: 08 Fabrication of the hull. Ex No: 09 Fabrication of super structure. Ex No: 10 Fabrication of navigation bridge.					60
TOTAL HOURS					60



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of different types of ship models may be given as mini project to students.
- Practice may be given in dismantling and assembling of ship machineries.
- Practice drawing different types of ships on charts.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Introduction to Marine Engineering by D.A.Taylor.
- Reeds Vol 5: Ship Construction for Marine Engineers by Paul Anthony Russell, E.A.Stokoe.
- Marine Engineering by Roy L.Harrington.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>

LIST OF EQUIPMENTS (for a batch of 30 students)

1. 300 Amps welding transformer with accessories	- 01
2. Sheet bending machine	- 01
3. Sheet cutting machine	- 01



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1020233440	INDUSTRIAL DRIVES AND CONTROL	L	T	P	C
Practicum		1	0	4	3

Introduction:

Motion control is required in a large number of industrial and domestic applications. Systems employed for getting the required motion and their smooth control are called Drives. Drives require prime movers like Diesel or petrol engines, gas or steam turbines, hydraulic motors or electric motors. These prime movers deliver the required mechanical energy for getting the motion and its control. Drives employing Electric motors as prime movers for motion control are called Electric Drives. Further electrical speed controls in almost all industrial applications are incomplete without the use of the specific electric drive. This course will empower the students with the necessary skills to understand the concept associated with Electrical Drives.

Course Objectives:

The objective of this course is to enable the student to

- Explain the necessity of A.C Circuit, Fuse, MCB, ELCB and Contactor.
- Explain the Working of RPS, Logic Gates and PLC.
- Define electric drive, its parts, advantages and explain choice of electric drive.
- Understand the characteristics of DC Shunt Motor and 3 Phase Induction Motor.
- Discuss the concept of AC Drive, Stepper Motor Drive and Servo Motor Drive.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Demonstrate the working of MCB, ELCB and Contactor.

CO2: Describe the working of RPS and Simple LED Circuit.

CO3: Describe the concept of Logic Gate and PLC.

CO4: Demonstrate the starting and speed control methods of Induction Motor.

CO5: Interface and test the working of Driver for DC Motor and Stepper Motor.

Pre-requisites:

Basics of Science and Engineering



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

CO/PO Mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	1	2	-		
CO2	3	1	1	2	-		
CO3	3	1	1	2	-		
CO4	3	1	1	2	-		
CO5	3	1	1	2	-		

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.
- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Incorporate formative and summative assessments to gauge student progress and provide targeted feedback.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments/ 50% Experiments	Cycle II Experiments/ Another 50% Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The Circuit Diagram, Readings, Calculations and Graph / Result should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Circuit Diagram	20
C	Connections and Execution	25
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. The marks awarded should be converted to 15 Marks for the internal assessment.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Circuit Diagram	20
C	Connections and Execution	25
D	Output / Result	10
E	Written Test (Theory Portions)	30
F	Viva Voce	10
TOTAL		100

Note: For the written test 30 MCQ shall be asked from the theory portions.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023

Syllabus Contents.

Theory Portion : UNIT I		
A.C CIRCUITS		Period
Review of Ohm's Law – Review of Series and Parallel Connection – Fundamentals of AC Voltage and Current - Peak Value, Average Value, RMS value of Sine wave – Frequency - Time period – Amplitude - Power and Power Factor – Current calculation by using single phase power formula – Introduction about Three phase ac supply - Current calculation by using three phase power formula - Necessity of Contactor - Solenoid type Contactor - Necessity of Fuse – Function of MCB – Function of ELCB.		4
ANALOG AND DIGITAL ELECTRONICS		
Name, Symbol and uses of Semiconductor Devices (Diode, Transistor, LED and SCR) – Importance of current limiting resistor in LED circuit – RGB LED - Working of Half wave and Full wave rectifiers - Block Diagram of Regulated Power Supply. Logic gates: Binary Number System - Positive and Negative Logic - Definition, Symbol, Truth table and Boolean expression for OR, AND, NOT, NOR, NAND, EX-OR and EX-NOR gates - Universal Logic Gates: NAND and NOR. Programmable Logic Controller: Definition - Block Diagram of Programmable Logic Controller – PLC Scan – Ladder Logic for AND Gate and OR Gate.		4
Practical Exercises:		
Ex.No	Name of the Experiment	Period
1.	VOLTAGE, CURRENT AND POWER MEASUREMENT IN SINGLE PHASE AC CIRCUIT. Activities to Perform: a) Conduct an experiment to measure voltage, current and power in a single phase a.c circuit by using Voltmeter, Ammeter and Wattmeter respectively for different loads. b) Repeat the same experiment by replacing above meters with a single Digital Power Monitor. c) Compare and Discuss the observations.	4



2.	<p>CONSTRUCT LED CIRCUIT WITH CURRENT LIMITING RESISTOR</p> <p>Activities to Perform:</p> <ol style="list-style-type: none"> From the voltage and current rating of the given LED, calculate the value of the resistor to be connected in series with it. Construct and test a simple circuit using DC Source, Resistor and LED. Construct and test a simple circuit using DC Source, Resistor and RGB LED. 	4
3.	<p>CONSTRUCT DC REGULATED POWER SUPPLY UNIT</p> <p>Activities to Perform:</p> <ol style="list-style-type: none"> Construct 5V or 12V DC Regulated Power Supply circuit using Bridge Rectifier, Capacitor Filter and IC Voltage Regulator. Observe the voltage at various stages of the circuit. Discuss the function of each stage of the RPS unit. 	4
4.	<p>DEMONSTRATE THE WORKING OF MCB AND ELCB</p> <p>Activities to Perform:</p> <ol style="list-style-type: none"> Connect Single Pole MCB with Load bank and Test the Tripping Operation for over load and/or Short Circuit fault. Connect ELCB with Lamp Load and Test the Tripping Operation for Earth fault. 	4
5.	<p>LOGIC GATE USING ICs</p> <p>Activities to Perform:</p> <ol style="list-style-type: none"> Construct the circuit and verify the Truth Tables of AND, OR, NOT, NAND, NOR, EX-OR Logic gates by using corresponding Logic Gate ICs. Compare and Discuss the observations. 	4

Theory Portion : UNIT II

ELECTRIC DRIVES



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

<p>Introduction – Need for Drive – Advantages of Electric Drive – Parts of Electric Drive – Classification of Drives (Group Drive, Individual Drive and Multimotor Drive) – Classification of Electric Motors - Characteristics of DC Shunt Motor and DC Series Motor – Necessity of starters - Three point starter.</p> <p>Construction, Working Principle and Characteristics of Three Phase squirrel cage induction motor – DOL Starter – Star Delta Starter - Effect of Unbalanced source voltage and Single Phasing – Methods of Speed control of three phase induction motor - Block diagram of Variable Frequency Drive (VFD) - Electric Braking – Types of Electrical Braking – Selection of Motors for different applications – Motors used for Traction system.</p> <p>Overview of PMDC Motor, BLDC Motor, Stepper Motor Drive, Servo Motor Drive – L293D Motor Driver IC.</p>	7
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Practical Exercises:

Ex.No	Name of the Experiment	Period
6.	<p>LOAD TEST ON DC SHUNT MOTOR</p> <p>Activity to Perform:</p> <ol style="list-style-type: none"> a) Conduct Load Test on given DC Shunt Motor b) Discuss the starting current and No load current of the Motor c) Plot the performance Characteristics. 	4
7.	<p>LOAD TEST ON THREE PHASE INDUCTION MOTOR</p> <p>Activity to Perform:</p> <ol style="list-style-type: none"> a) Conduct Load Test on given three phase squirrel cage Induction Motor. b) Discuss the starting current and No load current of the Motor c) Plot the performance Characteristics. 	4

8.	<p>SPEED CONTROL OF INDUCTION MOTOR USING VFD</p> <p>Activity to Perform:</p> <ol style="list-style-type: none"> a) Make connections and Control the speed of the given single phase or three phase squirrel cage induction motor by VFD. b) Discuss the features and advantages of VFD. 	4
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DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

9.	DIRECTION CONTROL OF DC MOTOR USING DRIVER IC L293D Activity to Perform: a) Interface L293D Motor Driver IC with Arduino to control Direction of rotation of Two DC Motors. b) Execute the Arduino program and observe the direction of rotation of Motors.	4
10.	TESTING OF STEPPER MOTOR DRIVE Activity to Perform: a) Interface suitable stepper motor driver with stepper motor. b) Test the operation of the driver circuit by observing the movement of the stepper motor.	4
Assessment Test + Revision + Students Activity		20
Total		75

Suggested List of Students Activity:

Activity 1: Study and understand the construction and working of DC Generator, Transformer and Alternators available in the Laboratory. Then each student shall write and submit the Report on the above topics.

Activity 2: Four students can be grouped as a batch to collect information about Industrial applications of various types of Electric Motors and submit as activity report. Reference books / website details/ Visited Industry details for collection of above information must be mentioned in the report itself.

Text book for Reference:

1. B. L. Theraja and A. K. Theraja, A Textbook of Electrical Technology Volume - II (AC and DC Machines), Multicolour Edition, S. Chand & Co., 2005.
2. V K Mehta, Rohit Mehta, Principles of Electronics, 12 th Edition, S. Chand & Co., 2020.
3. B.N. Sarkar, Fundamentals of Industrial Drives, 1 st Edition, PHI Learning Pvt. Ltd., 2012.
4. Frank D. Petruzella, Programmable Logic Controllers, 6 th Edition, Indian Edition, Mc Graw Hill, 2023.

Web-based/Online Resources:

- <https://nptel.ac.in/courses/108/104/108104140/#>
- <https://archive.nptel.ac.in/courses/108/105/108105155/>
- <https://archive.nptel.ac.in/courses/108/105/108105158/>
- <https://archive.nptel.ac.in/courses/108/105/108105132/>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Equipment / Facilities required to conduct the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	MI Ammeter 0-5A, MI Voltmeter 0- 300V, ED Wattmeter 300V/5A, Digital Power Monitor, Lamp Load.	Each 1 No.
2.	5V/12V DC Power Supply Unit, LED, RGB LED and Resistors.	Each 1 No.
3.	230V/12V Transformer, Diodes, Filter Capacitor, Voltage Regulator IC, Resistors and CRO.	Each 1 No.
4.	3 Amps MCB and 30mA ELCB.	Each 1 No.
5.	5V RPS, Logic Gate ICs: 7408, 7432, 7404, 7400, 7402 & 7486, Toggle Switches, LEDs and Resistors.	Each 5 Nos.
6.	DC Shunt Motor with Starting and Loading arrangements.	1 No.
7.	Contactors and NO, NC Push buttons.	Each 1 No.
8.	3 Phase Squirrel Cage Induction Motor with Starting and Loading arrangements.	1 No.
9.	Variable Frequency Drive.	1 No.
10.	DC Motor, L293D Motor Driver IC and Arduino Shield.	1 No.
11.	Stepper Motor with Driver Shield.	1 No.
12.	Suitable range of MC Voltmeter and Ammeter for DC Motor.	Each 1 No.
13.	Suitable range of MI Voltmeter and Ammeter for AC Motor.	Each 1 No.
14.	Tachometer.	1 No.
15.	Digital Multimeter.	4 Nos.

Note:

- Sufficient number of Worktables to be provided in the laboratory to conduct experiments for students.
- Ensure Permanent wiring connections with suitable circuit breakers / Protective mechanism in the Worktables with proper safety measures.
- In addition to the above list sufficient quantities of consumable, Tools and Testing Instruments to be maintained.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Charts on Electrical Safety and Procedure of First Aid to be displayed in the Laboratory.
- Necessary proper electrical safety arrangements should be done in the laboratory.
- Awareness about the First Aid for Electrical accidents should be given.

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The practical document prepared by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Circuit Diagram	20
C	Connections / Execution	25
D	Output / Result	10
E	Written Test	30
F	Viva Voce	10
TOTAL		100

Note: For the written test 30 MCQ shall be asked from the theory portions.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027233540	MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS	L	T	P	C
Practicum		1	0	4	3

Introduction:

Ships are subject to different types of loads. These loads cause stresses in ships and result in the formation of shear force and bending moment. Loads and stresses are experienced unevenly at different parts of the ships. Movement of ships on waves can also cause stresses and strain depending on the position of the crest and trough of the wave. This study is done by considering the ship as a simply supported beam. Pumps and pressure gauges also play a major role in ships.

Course objectives:

The objective of this course is to enable the student to

- Understand the various forces and stresses acting on a body.
- Further, the student should understand the principle of centroid of sections.
- Learn the stresses developed in beams under various loads. The student should be able to comprehend the effect of shear force & bending moment on beams.
- Understand the properties of fluid in motion and hydrostatic forces on surfaces, the fluid kinematics and fluid dynamics of motion. The applications of the conservation of laws to flow through pipes are studied.
- Comprehend functions of pumps. All these should be achieved both conceptually and through solved examples.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Determine hardness of materials.
- CO2: Know the shear force and bending moment.
- CO3: Understand the fluid properties.
- CO4: Summarise the fluid motion.
- CO5: Study the performance of different types of pumps.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	3	3	1
CO2	2	3	1	2	2	1	3
CO3	2	1	3	2	3	2	1
CO4	3	2	3	2	3	1	2
CO5	1	2	2	3	2	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Tabulation / Calculation	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Formula / Tabular column	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Syllabus content

1027233540	MARINE STRENGTH OF MATERIALS AND FLUID MECHANICS		L	T	P	C
Practicum			1	0	4	3
Unit I						
Theory Definitions of mechanical properties of metals Classification of force systems – tensile, compressive, shear, bending and torsional force systems – Behaviour of mild steel bar in axial tension up to rupture – stress strain diagram. Hook’s Law, Young’s Modulus, working stress, factor of safety.						3
Practical Ex No: 01 1. Test on Ductile Materials: Finding Young’s Modulus of Elasticity, yield points, percentage elongation and percentage reduction in area, stress strain diagram plotting, tests on mild steel. (Equipment : UTM) Ex No: 02 Rockwell Hardness Test: Determination of Rockwell hardness number for various materials like mild steel, brass, copper and aluminium. (Equipment : Rockwell Hardness Testing Machine)						12
Unit II						
Theory Classification of beams – shear force and bending moment – types of loads. Types of springs – laminated and coiled springs and applications – types of coiled springs – difference between open and closely coiled helical springs.						3
Practical Ex No: 03 Bending and deflection tests: Determination of Young’s Modulus for steel by deflection test. (Equipment : Deflection testing arrangement) Ex No: 04 Tests on helical springs: Determination of modulus of rigidity, strain energy, shear stress by load deflection method.						12



(Equipment: Tension testing arrangements)		
Unit III		
<p>Theory</p> <p>Fluid Properties - Density - Specific weight - Specific volume – Relative density - Viscosity - Vapour pressure – compressibility - surface tension – capillarity - cohesion – adhesion – Pressure - Pascal's law - Pressure head - Atmospheric pressure - Absolute pressure – Gauge pressure and vacuum pressure.</p> <p>Manometers - Piezometer - simple manometer - Differential manometer.</p>	3	
<p>Practical</p> <p>Ex No: 05 Determination of Coefficient of discharge of a Venturimeter. (Equipment: A Centrifugal pump having the discharge line with Venturimeter arrangement)</p> <p>Ex No: 06 Determination of Coefficient of discharge of a Orifice meter. (Equipment: A Centrifugal pump having the discharge line with Orifice meter arrangement)</p>	12	
Unit IV		
<p>Theory</p> <p>Types of flow - Laminar flow - Turbulent flow - Steady flow - Unsteady flow – Uniform flow - Non-uniform flow</p> <p>Different types of Heads and Energies of a liquid in motion – Bernoulli's theorem - Applications and limitations</p> <p>Laws of fluid friction for laminar and turbulent flow - head lost due to friction - Darcy Weisbach equation and Chezy's formula.</p>	3	
<p>Practical</p> <p>Ex No: 07 Verifying the Bernoulli's Theorem (Equipment: The Bernoulli's Apparatus)</p> <p>Ex No: 08 Determination of the Friction Factor in a Pipe (Equipment: An arrangement to find friction factor)</p>	12	
Unit V		



<p>Theory</p> <p>Reciprocating pumps - Classifications - single acting - Double acting reciprocation pumps - discharge of a reciprocating pump - theoretical power required - coefficient of discharge - slip – percentage of slip.</p> <p>Centrifugal pumps - classifications – types of casing – volute – vortex – diffuser casings. Types of impellers – closed, open and semi open impellers.</p>	3
<p>Practical</p> <p>Ex No: 09 Performance test on a reciprocating pump and draw the characteristic curves.</p> <p>(Equipment: A reciprocating pump with an arrangement for collecting data to find out the efficiency and plot the characteristic curves)</p> <p>Ex No: 10 Performance test on a centrifugal pump and draw the characteristic curves.</p> <p>(Equipment: A centrifugal pump with an arrangement for collecting data to find out the efficiency and plot the characteristic curves)</p>	12
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Identify different metals and alloys and prepare a poster.
- Consider the ship as a beam and analyse the stresses on the ship and conduct seminar.
- Study the flow of water in relation to the movement of ship and conduct seminar.
- Learn the uses of different types of pumps in ships and conduct seminar.

Reference:

- Strength of Materials, R.S.Kurmi. S.Chand & Company Ltd.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Hydraulics, Fluid Mechanics and Hydraulic machines, R.S.Kurmi, S.Chand & Company Ltd.
- Strength of Materials, S. Ramamrutham, Dhanpat Rai Company.
- Hydraulics, Fluid Mechanics and Fluid machines, S. Ramamrutham ,Dhanpat Rai Company.

Web-based/online resources:

- <https://youtu.be/GkFgysZC4Vc?si=Cp8mWKmSm2Gjk3XL>
- <https://youtu.be/XNJLZMGPCBM?si=2lgR2iAFheFOKIZX>
- <https://me.iitp.ac.in/Virtual-Fluid-Laboratory/>
- <https://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html>
- <https://fm-nitk.vlabs.ac.in/List%20of%20experiments.html>

LIST OF EQUIPMENTS (for a batch of 30 students)

Strength of Materials Lab

- | | |
|--------------------------------------|------|
| 1. Universal testing machine (UTM) | - 01 |
| 3. Rockwell hardness testing machine | - 01 |
| 5. Deflection testing arrangement | - 01 |
| 6. Tension testing arrangements | - 01 |

Fluid Mechanics Lab

- | | |
|---|------|
| 1. The Bernoulli's Apparatus | - 01 |
| 2. Venturimeter / Orifice meter arrangement | - 01 |
| 3. An arrangement to find friction factor | - 01 |
| 4. Reciprocating pump | - 01 |
| 5. Centrifugal pump | - 01 |



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027233640	MARINE WORKSHOP PRACTICE - I	L	T	P	C
Practicum		1	0	4	3

Introduction:

Lathe work is mainly used in ships when non standard nuts, bolts and threads need to be prepared. Cast iron is one of the major materials uses in manufacturing ships. Many parts of ships are cast in foundry. Cracks and breakages are formed in ships due to scale formation and corrosion. These damages are corrected by welding. In some cases pipes also need to be joined by welding.

Course objectives:

The objective of this course is to enable the student to

- Introduction of tools and equipments
- Introduction about lathe and its parts
- Types of patterns
- Types of sand
- Preparation of sand moulds
- Core sands, preparation of cores
- Introduction about welding equipments and accessories
- Types of welded joint
- Edge Preparation.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn the simple turning operations on lathe
- CO2: Know the thread cutting and knurling operations on lathe.
- CO3: Understand the materials used for moulding.
- CO4: Practice arc welding.
- CO5: Acquire knowledge about other welding methods used in ships.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	3	3	3	1	1
CO2	3	3	3	3	2	1	1
CO3	3	3	3	3	3	2	1
CO4	3	3	3	3	2	2	1
CO5	2	3	2	3	3	3	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus contents

1027233640	MARINE WORKSHOP	L	T	P	C
Practicum	PRACTICE - I	1	0	4	3
Unit I	LATHE WORK				
Theory Working principle of tumbler gear mechanism, quick change gear box, apron mechanism, carriage cross slide. Feed mechanism: automatic feed, longitudinal feed and cross feed.					3
Practical Ex No: 01. Prepare the specimen and make plain turning using the lathe. Ex No: 02. Prepare the specimen and make step turning using the lathe.					12



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Unit II	OTHER OPERATIONS ON LATHE	
Theory	Operations: straight turning – step turning – taper turning – knurling – thread cutting – facing – boring – chamfering. Cutting speed – feed – depth of cut.	3
Practical	Ex No: 03. Prepare the specimen and make thread cutting using the lathe. Ex No: 04. Prepare the specimen and make knurling using the lathe.	12
Unit III	MOULDING	
Theory	Moulding boxes, moulding sand – ingredients – silica – clay – moisture and miscellaneous materials – properties of moulding sand – sand additives – moulding sand preparation – moulding tools – mixing – tempering and conditioning – types of moulding – green sand – dry sand – machine moulding.	3
Practical	Ex No: 05. Prepare the green sand moulding using any one solid pattern in the foundry. Ex No: 06. Prepare the green sand moulding using any one split pattern in the foundry.	12
Unit IV	ARC WELDING	
Theory	Arc welding equipment – arc welding methods – carbon arc, metal arc, Metal Inert gas (MIG), Tungsten inert gas (TIG), Atomic hydrogen, Plasma arc, Submerged arc and Electro slag welding.	3
Practical	Ex No: 07. Prepare the specimen and make the lap joint by arc welding (both side welded). (Raw material: 25mm X 6mm MS flat). Ex No: 08. Prepare the specimen and make the butt joint by arc welding (both side welded). (Raw material: 25mm X 6mm MS flat).	12
Unit V	GAS WELDING AND SPOT WELDING	
Theory	Gas welding equipment– oxy acetylene welding – three types of flame– resistance welding – classification of resistance welding – butt – spot – seam – projection welding	3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Practical Ex No: 09. Prepare the specimen and make the lap joint by gas welding. (Raw material: 25mm X 6mm MS flat). Ex No: 10. Prepare the specimen and make the butt joint by gas welding. (Raw material: 25mm X 6mm MS flat).	12
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation a chart of lathe and mention its parts.
- Preparation a chart and draw the specimen for different operations.
- Draw the different welding equipments on chart.
- Identify different welding operations used in ship.

Reference:

- Elements of workshop Technology By S.K Hajra Choudhury , A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd.
- A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi.
- A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications (P) Ltd.
- A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications (P) Ltd.

Web-based/online resources:

- <https://www.reliance-foundry.com>
- <https://www.twi-global.com/>
- https://www.nakamura-tome.com/machine_articles/about-lathe/

LIST OF EQUIPMENTS (for a batch of 30 students)



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Centre lathe - 06

Foundry

1.	Pattern (each)	- 07
2.	Moulding box (16" x 16" x 4")	- 15
3.	Runner	- 15
4.	Riser	- 15
5.	Shawel	- 05
6	Gate cutter	- 15
7.	Spirit level	- 02
8.	plastic bucket	- 05
9.	moulding sand	- 500kg
10.	Rammer	- 15
11	vent rod	- 15
12	Draws spike	- 15
13	mallet small size	- 05
14	Bellows	- 03

Welding

1	300 Amps welding transformer with accessories	- 01
2	oxy – acetylene gas welding set with accessories	- 01
3	Spot welding m/c with accessories	- 01



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

IV SEMESTER



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023

1027234110	MARINE DIESEL ENGINE AND POWER PLANT	L	T	P	C
Theory		3	0	0	3

Introduction:

The proper working and maintenance of the main engine is very important for the ship. Hence enough knowledge has to be acquired for proper running and maintenance of the main engine. Knowledge about parts of the engine, working principles, functioning of cooling system, safety provisions and automation is necessary. Study of reciprocating steam engine, steam turbines and power generation by non conventional sources of the energy is also required.

Course objectives:

The objective of this course is to enable the student to

- Understand the parts and working of I.C. engines.
- Acquire knowledge about starting and reversing system of marine diesel engines.
- Study about Cooling system, safety provision and Automation in marine diesel engines.
- Acquire broader ideas about reciprocating steam engine and steam turbines.
- Understand about power generation using conventional and non-conventional resources.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn the engine cycles and parameters of ship.
- CO2: Know the starting and reversing systems of main engine.
- CO3: Understand the cooling and scavenging systems.
- CO4: Summarise the ignition and automation of engine.
- CO5: Have an idea about the activities in power plants.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	3	2	3	2
CO2	3	2	2	3	2	3	2
CO3	3	2	3	2	3	2	2
CO4	3	2	3	3	3	2	2
CO5	3	3	3	1	3	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus content

1027234110	MARINE DIESEL ENGINE AND POWER PLANT	L	T	P	C
Theory		3	0	0	3
Unit I	ENGINE CYCLE AND ENGINE PARAMETERS				
Otto cycle – Diesel cycle – dual cycle - Flash point – fire point – density – specific gravity – viscosity – compression pressure ratio – peak pressures - Working principles – two stroke & four stroke engines – working and comparison.					9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

Unit II	MARINE DIESEL ENGINE STARTING AND RUNNING	
	Working of four cylinder and six cylinder in-line marine diesel engine – warming up procedure for main engine – air starting system for main engine – reversing systems of main engine – factors affecting performance of marine engine – fuel pump – design aspects of combustion chamber.	9
Unit III	COOLING SYSTEM AND SCAVENGING	
	Need for cooling – jacket water cooling system – lubrication oil cooling system – basic governor function and over speed governor – types of scavenging systems – loop flow, cross flow and uniflow – turbo chargers and super charger – need of turbo charger for marine diesel engines.	9
Unit IV	IGNITION AND AUTOMATION	
	Spark ignition and compression ignition – working and comparison – pre ignition – ignition delay – crank case explosion – oil mist detector to prevent explosion – viscosity controller. Automation – need for automation – alarm system – scanning system. Engine control room automation – unmanned ship engine room operation.	9
Unit V	POWER PLANTS	
	Reciprocating steam engine, parts and working – steam turbines, parts and working – gas turbine working – combined gas turbine and steam turbine – principles of operation of atomic reactors – construction and working of atomic power installations.	9
TOTAL HOURS		45

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of two stroke and four stroke engine models.
- Practice may be given in dismantling and assembling of engines.
- Prepare the chart of cooling system and scavenging system.
- Prepare models of power plants.
- Industrial visits may be arranged to power plants.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Reference:

- Marine Diesel engine – D.K. Sanyal.
- Power Plant Engineering – Vijaya ragavan.
- Marine Diesel Engine – Mc George.

Web-based/online resources:

- <https://academy.marineinsight.com/courses/introduction-marine-diesel-engine/>
- <https://www.nautilusshipping.com/types-of-marine-diesel-engines>
- https://www.pfri.uniri.hr/bopri/documents/BS_ALT_2_INTRO_2_4_stroke_www.pdf



1027234230	MARINE WORKSHOP TECHNOLOGY – II	L	T	P	C
Practicum		2	0	2	3

Introduction:

Any repair of machinery within the ship while sailing will have to be carried out by the engineers in the ship. Some spare parts will not be available in the ship. Such parts need to be manufactured within the ship. This can be done by using special machines. Marine engineers should have adequate knowledge about the use of special machines.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about the concepts and working principles of special machineries.
- Learn the recent trends in manufacturing.
- Familiarise with the manufacturing industry.
- Understand the difficulties faced while working with special machineries.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn the working of planer machine.
- CO2: Know the operation of shaper and slotter machine.
- CO3: Understand the working of drilling machine.
- CO4: Familiarise the operation of milling machine.
- CO5: Have an idea about the abrasive process.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	3	3	1	2	2
CO2	2	3	3	3	1	2	2
CO3	2	3	3	3	1	2	2
CO4	2	3	3	3	1	2	2
CO5	2	3	3	3	1	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Any Two Units)	Written Test Theory (Another Two Units)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2, Assessment written test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should answer Five questions.

Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim / Apparatus required	10
B	Procedure / Observation	15
C	Performance / Work	25
D	Result / Output	10
E	Practical document (All Practicals)	30
F	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

- 18.
- 19.
- 20.

Syllabus Contents

1027234230		MARINE WORKSHOP TECHNOLOGY – II			
Practicum					
Unit I	PLANER				
Theory					6
Types of planers – Double housing planer – open side planer – pit planer – edge planer – divided table planer – specifications – principles of operation – drives – quick return mechanism – open and cross belt drive – electric drive – hydraulic drive – feed mechanism – work holding devices – planer operation.					
Practical					6
Ex.1. Demonstration of planer.					
Unit II	SHAPER and SLOTTER				
Theory					6
SHAPER: Types of shapers – specifications – standard – plain - universal – draw cut shaper – principles of operation – drives – quick return mechanism – crank and slotted link – feed mechanism – work holding devices. SLOTTER: Types of slotter – specifications – method of operations – Whitworth quick return mechanism – feed mechanism – work holding devices.					
Practical					6
Ex. 2. Demonstration of shaping machine. Ex. 3. Demonstration of slotting machine.					
Unit III	DRILLING MACHINES				
Theory					6
Drills – nomenclature of twist drill — types of drilling machines – floor type – radial type – gang drill – principle of operation in drilling — method of holding drill bit – drill chucks – socket and sleeve – drilling operation – reaming – counter boring – counter sinking – spot facing – tapping – deep hole drilling.					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Practical		6
Ex.4. Demonstration of drilling machine.		
Unit IV	MILLING MACHINES	
Theory		
Types - column and knee type – plain milling machine – universal milling machine – specifications of milling machines -principles of operation - work and tool holding devices – arbour – stub arbour – spring collet – adapter – milling cutters – cylindrical milling cutter – side milling cutter – T-slot milling cutter – fly cutter – nomenclature of cylindrical milling cutter – milling process – conventional milling – climb milling – milling operations – straddle milling – gang milling.		6
Practical		6
Ex.5. Demonstration of milling machine.		
Unit V	ABRASIVE PROCESS	
Theory		
Types and classification – specifications – portable grinders – precision grinding – cylindrical grinder – centerless grinders – surface grinder – principles of operations – grinding wheels – abrasives – natural and artificial abrasives – types of bonds – grit, grade and structure of wheels – wheel shapes and sizes – standard marking systems of grinding wheels – mounting of grinding wheels – Dressing and Truing of wheels – Balancing of grinding wheels.		6
Practical		6
Ex. 6. Demonstration of surface grinding.		
Ex. 7. Demonstration of cylindrical grinding		
TOTAL HOURS		60

Suggested list of students’ activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of chart of Planer with parts labeled in it.
- Preparation of chart of Shaper and Slotter with parts labeled in it.
- Preparation of chart of Drilling machine with parts labeled in it.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Preparation of chart of Milling machine with parts labeled in it.
- Industrial visits may be arranged to manufacturing units.

Reference:

- Elements of Workshop Technology By S.K Hajra Choudhury, A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd.
- A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi.
- A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications(P) Ltd.
- A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications(P) Ltd.

Web-based/online resources:

- <https://testbook.com/mechanical-engineering/planer-machine>
- <https://pathakmachines.com/shaper-machine-working-principle-different-types-operations-and-much-more-explained/>
- <https://engineering.myindialist.com/2009/principle-and-working-of-drilling-machine/>
- <https://themechanicalengineering.com/milling-machine/>

LIST OF EQUIPMENTS (for a batch of 30 students)

1.	Surface grinding machine	- 01
2.	Milling M/C	- 02
3.	Drilling M/C	- 02



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027234320	SHIP CONSTRUCTION TECHNOLOGY PRACTICAL - II	L	T	P	C
Practical/Lab		0	0	4	2

Introduction:

Marine engineering involves the construction, operation and maintenance of equipments used in ships. Ship construction and ship repair forms a major sector in the shipping industry. Parts are joined mainly by welding. The basic job of a marine engineer includes the designing, building and maintenance of ships and its equipments.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about different types of ships.
- Learn the construction of different types of ships.
- Familiarise with welding.
- Understand the works carried out in workshops.
- Have basic information about shipyards.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the types of ships.
- CO2: Know the machineries used in ships.
- CO3: Understand the parts of ships.
- CO4: Have good practice in welding.
- CO5: Get an idea about the activities in shipyards.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	3	2	3	3	1
CO2	3	1	3	2	2	3	1
CO3	3	1	3	2	3	3	1
CO4	3	2	3	2	3	3	3
CO5	2	1	2	2	3	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- This practical is a continuation of Ship Construction Technology Practical – I of third semester.
- The experiments given in this subject are to be done by a group of students.
- The group may consist of a maximum of six students.
- Each group should complete assembling and finishing of any one of the ship models given in the syllabus.
- Ship models should be made of mild steel sheets.
- The parts of ship models prepared by the students in Ship Construction Technology Practical – I of third semester can be used for assembling.
- Assembling of ship parts should be done by welding.
- All precautionary measures should be taken while doing the experiments.
- Students should wear safety shoes.

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Portion	First Cycle / 50 % Exercises	Second Cycle / Another 50 % Exercises	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	Each Practical 10 Marks	100	100
Converted to Marks	10	10	10	20	60
Internal Marks	40				60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. Ship models should be made of chart paper. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & Tools required	5
B	Preparation / Procedure	20
C	Cutting/ Joining	15
D	Finish / Output	10
TOTAL		50



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

- **CA 3:** Practical document should be maintained for every exercise / experiment immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate.
- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. Ship models should be made of mild steel sheets. The experiments given in this examination are to be done by a group of students. The group may consist of a maximum of six students. The examiner will supply the prepared parts of ship model and ask the candidate to assemble the parts by welding. Record of work done should be prepared; the same should be submitted for the end semester examination. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination- Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Tools required	10
B	Preparation / Procedure	20
C	Cutting/ Joining	20
D	Welding	20
E	Finish / Output	20
F	Viva Voce	10
TOTAL		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Syllabus Content

1027234320	SHIP CONSTRUCTION	L	T	P	C
Practical	TECHNOLOGY PRACTICAL - II	0	0	4	2
Ex No: 1 Preparation of bulk carrier ship model. Ex No: 2 Preparation of container ship model. Ex No: 3 Preparation of oil tanker ship model. Ex No: 4 Preparation of gas tanker ship model. Ex No: 5 Preparation of war ship model.					60
TOTAL HOURS					60

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of charts of different ships.
- Practice different welding methods.
- Practice riveting of steel plates.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Introduction to Marine Engineering by D.A.Taylor.
- *Seamanship Primer* by Capt. J.Dinger, Bhandarkar Publishing.
- Branch's Elements of Shipping by Alan Edward Branch, Michael Robarts.
- Reeds Vol 5: Ship Construction for Marine Engineers by Paul Anthony Russell, E.A.Stokoe.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

LIST OF EQUIPMENTS (for a batch of 30 students)

1. 300 Amps welding transformer with accessories - 01
2. Sheet bending machine - 01
3. Sheet cutting machine - 01



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027234440	MARINE ENGINE MECHANISM	L	T	P	C
Practicum		1	0	4	3

Introduction:

Almost all the ships are using diesel engines. Basic knowledge about diesel engines can be had from the diesel engines which are dismantled in the laboratories. A visit to power plant will enhance the knowledge of the student.

Course objectives:

The objective of this course is to enable the student to

- Dismantling and assembling of diesel engine
- Valve timing diagram of diesel engine – four stroke engine
- Port timing diagram of diesel engine – two stroke engine
- Fuel consumption test on multi cylinder diesel engine
- Dismantling and assembling of diesel injector
- Dismantling and assembling of fuel pump
- Fuel injector pressure test
- Diesel engine injection time setting

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the single cylinder and multi cylinder engine.
- CO2: Know the valve timing and port timing diagrams.
- CO3: Understand the working of marine diesel engine.
- CO4: Summarise the safety provisions for diesel engines.
- CO5: Have an idea about the functioning of power plants.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	3	2	1
CO2	3	2	2	3	3	2	1
CO3	3	2	2	3	3	2	1
CO4	3	2	2	3	3	2	1
CO5	3	2	2	3	3	2	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Tabulation / Calculation	15
C	Procedure / Execution	20
D	Output / Result	10



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Formula / Tabular column	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus Contents

1027234440		MARINE ENGINE MECHANISM	L	T	P	C
Practicum			1	0	4	3
Unit I						
Theory	Parts and functions of diesel engine - Engine components – cylinder – cylinder liner – cylinder head – piston – piston rod – connecting rod – crank shaft – cross head – piston rings – rocker arm arrangement – cam shaft – fly wheel – tools required for engine dismantling and assembling.					3
Practical	Ex No: 01. Dismantling and assembling of single cylinder engine. Ex No: 02. Dismantling and assembling of multi cylinder engine.					12
Unit II						
Theory	Working principles – two stroke & four stroke engines – working and comparison – valve operation in four stroke engine and port operation in two stroke engine.					3
Practical	Ex No: 03. Valve timing diagram of diesel engine – four stroke engine. Ex No: 04. Port timing diagram of diesel engine – two stroke engine.					12
Unit III						
Theory	Working of four cylinder in-line marine diesel engine - working of and six cylinder in-line					3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

marine diesel engine - need for injector - importance of atomization.		
Practical Ex No: 05. Fuel consumption test on multi cylinder diesel engine. Ex No: 06. Dismantling and assembling of diesel injector.		12
Unit IV		
Theory Need for safety provision – basic governor function and over speed governor - spark ignition and compression ignition – working and comparison – pre ignition – ignition delay.		3
Practical Ex No: 07. Fuel injector pressure test. Ex No: 08. Diesel engine injection time setting.		12
Unit V		
Theory Construction and working of power plants: Thermal power plant, solar power plant, wind power plant, hydal power plant and tidal power plant.		3
Practical Ex No: 09. Visit to power plant and submit a report.		12
TOTAL HOURS		75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of charts for marine diesel engine.
- Practice may be given in dismantling and assembling of marine diesel engine.
- Prepare models of two stroke & four stroke engines.
- Preparation of charts indicating the functions of power plants.
- Industrial visits may be arranged to ports and shipyards.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Reference:

- Marine Diesel engine – D.K. Sanyal.
- Power Plant Engineering – Vijaya ragavan.
- Marine Diesel Engine – Mc George.

Web-based/online resources:

- <https://academy.marineinsight.com/courses/introduction-marine-diesel-engine/>
- <https://www.nautilusshipping.com/types-of-marine-diesel-engines>
- https://www.pfri.uniri.hr/bopri/documents/BS_ALT_2_INTRO_2_4_stroke_www.pdf

LIST OF EQUIPMENTS (for a batch of 30 students)

1. Diesel engine	- 1 No
2. Cut section of four stroke engine	- 1 No
3. Cut section of two stroke engine	- 1 No
4. Multi cylinder diesel engine	- 1 No
5. Diesel injector	- 1 No
6. Fuel pump	- 1 No
7. Fuel injector pressure test kit	- 1 No
8. Diesel engine injection time setting machine	- 1 No



1027234540	SEAMANSHIP AND LIFE SAVING APPLIANCES	L	T	P	C
Practicum		1	0	4	3

Introduction:

Diploma holders in marine engineering should have enough knowledge about different types of ropes and their uses. Ropes are used to tie knots and to lift heavy materials. Different types of ropes have different properties and they are made up of different materials. Blocks and tackles are used to handle heavy materials. Ship maintenance is very important because the ship is sailing in rough weather and in salt water. Different life saving appliances are used in ship.

Course objectives:

The objective of this course is to enable the student to

- Understand about different types of ropes and their properties.
- Know about the blocks, tackles and cargo work.
- Study about tank and bilge soundings in the ship.
- Acquire broader ideas about life saving appliances.
- Understand about abandon ship and boat sailing.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the types of ropes.
- CO2: Know the blocks tackles.
- CO3: Understand the ship maintenance.
- CO4: Summarise the life saving appliances in ships.
- CO5: Have an idea about the emergency equipments used in ships.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	2	1	3	2	1
CO2	2	3	2	1	3	2	1
CO3	2	3	2	1	3	2	1
CO4	2	3	2	1	3	2	1
CO5	2	3	2	1	3	2	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Tabulation / Calculation	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

B	Formula / Tabular column	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus content

1027234540		SEAMANSHIP AND LIFE SAVING			
Practicum		L	T	P	C
		APPLIANCES			
Unit I	Ropes, types and construction				
Theory Vegetable fibre ropes – construction, coiling, faking, cheeing down, whipping, Characteristics, care and maintenance. Steel wire ropes – Construction, special types, coiling, cutting, care and maintenance. Synthetic fibre ropes – material used, construction, special characteristics and care of synthetic ropes.					3
Unit II	Blocks, tackles and cargo handling				
Theory Blocks – Parts of block, types of blocks, overhauling blocks. Tackles – Parts of tackles, types of tackles.					3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Cargo handling – Accident prevention when working cargo, preparing ship for sailing after cargo handling, ventilation of cargo during the voyage.		
Unit III	Duties and Ship maintenance	
Theory Time and watches – bells – ship duties – tank and bilge soundings. Lights and signals – lights and signals for power driven ships under way – ships at anchor – ships not under command – ship ran aground. Ship maintenance – chipping – scrapping – sand blasting – methods of painting – types of paints used in ships – painting defects.		3
Unit IV	Life saving appliances	
Theory Life saving appliances – life buoys – life jackets – Inflatable life raft and its equipments – rigid life raft – life boat – marking on a life boat – parts of life boat – davits – types of davits – life boat equipments and their uses – open type lifeboat – partially enclosed lifeboat – fully enclosed lifeboat – pyrotechniques – hand flares – rocket parachutes – buoyant smoke signals.		3
Unit V	Emergency equipments	
Theory Life boat launching – hydrostatic release unit – survival at sea – search and rescue. Breathing apparatus – self contained breathing apparatus – bellow type breathing apparatus – emergency escape breathing apparatus – thermal protective aid – immersion suit.		3
PRACTICAL		
Ex No: 01. Study about the construction of different types of ropes and its uses. Ex No: 02. Study of different types of knots and its uses. Ex No: 03. Study of different types of blocks and purchases and its applications. Ex No: 04. Study about the construction and working of inflatable life raft. Ex No: 05. Determining the tank and bilge soundings Ex No: 06. Study about the construction and working of life boat. Ex No: 07. Study about the construction and working of life jacket. Ex No: 08. Study about the construction and working of life buoy.		60



Ex No: 09. Study about the construction and working of EPIRB.	
Ex No: 10. Study about the construction and working of rigid life raft.	
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Different types of ropes may be collected and exhibited on boards.
- Charts may be prepared for different types of blocks and tackles.
- Draw the equipments used for ship maintenance on charts.
- Draw pictures of life saving appliances on charts.
- Conduct drill for emergency equipments.

Reference:

- *Seamanship Primer by Capt. J.Dinger*, Bhandarkar Publishing.
- Survival in Life boat and life raft By Capt. S.K. Puri
- Survival at sea, the life boat and life raft C.H. Wright, Brownson & Furguson Ltd.
- Ship board operation H.I. Lavery, British library cataloguing publications.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>

LIST OF EQUIPMENTS (for a batch of 30 students)

1. Different types of ropes. - 1 No



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

2. Different types of knots. - 1 No
3. Different types of blocks - 1 No
4. Emergency position indicating radio beacon (EPIRB). - 1 No
5. Life jacket. - 1 No
6. Life buoy. - 1 No
7. Inflatable life raft. - 1 No
8. Rigid life raft. - 1 No
9. Life boat. - 1 No
10. Sounding tape and sounding rod - 1 No



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027234640	MARINE WORKSHOP PRACTICE –	L	T	P	C
Practicum		1	0	4	3

II

Introduction:

Special machines have found their use not only in manufacturing sector but also in shipping industry. Any repair of machinery within the ship while sailing will have to be carried out by the engineers in the ship. Some spare parts will not be available in the ship. Such parts need to be manufactured within the ship. This can be done by using special machines. Marine engineers should have adequate knowledge about the use of special machines.

Course objectives:

The objective of this course is to enable the student to

- Identify the parts of a drilling machine, milling machine & grinding machine and their functions.
- Use tools and instruments for drilling, milling and grinding
- Identify the work holding devices
- Hold the work in proper work holding devices.
- Set the tools for various operations.
- Operate the drilling machine, milling machine and grinding.
- Machine a component using drilling machine, milling machine and grinding machine..
- Follow safety practices while machining.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the working of shaper machine.
- CO2: Know the operations of slotter machine.
- CO3: Understand the functioning of milling machine.
- CO4: Summarise the working of grinding machine.
- CO5: Have an idea about the drilling machine.

Pre-requisites:

Knowledge of basic science.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	2	3	3	2	1
CO2	1	1	2	3	3	2	1
CO3	1	1	2	3	3	2	1
CO4	1	1	2	3	3	2	1
CO5	1	1	2	3	3	2	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (Minimum one question from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus contents

1027234640	MARINE WORKSHOP		L	T	P	C
Practicum	PRACTICE – II		1	0	4	3
Unit I	SHAPER					
Theory						
Specifications – principles of operations – standard shaper – quick return mechanism – crank and slotted link – hydraulic shaper – feed mechanism – operations.						3
Practical						
Ex No: 01 Make ‘V’ block using shaping machine.						12
Ex No: 02 Make dovetail using shaping machine.						
Unit II	SLOTTER					
Theory						
Specifications – method of operation – Whitworth quick return mechanism - feed mechanism – types of tools.						3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Practical Ex No: 03 Make groove cut using slotting machine. Ex No: 04 Make key way – slot using slotting machine.		12
Unit III	MILLING MACHINES	
Theory column and knee type, plain, vertical and universal milling machines – principles of operation – specification of milling machines – work holding devices – tool holding devices – arbor – stub arbor – spring collet – adaptor.		3
Practical Ex No: 05 Make round to hexagon in milling machine. Ex No: 06 Make spur gear using milling machine.		12
Unit IV	GRINDING MACHINES	
Theory Types and classification – specifications – rough grinding – pedestal grinders - portable grinders – belt grinders. Precision grinding – cylindrical grinder – centerless grinders - surface grinder – tool and cutter grinder – planetary grinders.		3
Practical Ex No: 07 Make progressive type plug gauge using cylindrical grinding machine. Ex No: 08 Make a plain surface using surface grinder.		12
Unit V	DRILLING MACHINES	
Theory Drills – flat drills – twist drills – nomenclature of twist drill – types of drilling machines – bench type – floor type – radial type – gang drill – multi spindle type – principle of operation in drilling – methods of holding drill bit – drill chucks – socket and sleeve – drilling operation – reaming, counter sinking, counter boring, spot facing, tapping and deep hole drilling.		3
Practical Ex No: 09 Make a through hole drilling using drilling machine. Ex No: 10 Make a through hole drilling with counter sunk using drilling machine.		12
TOTAL HOURS		75



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Prepare charts of shaper, slotter, milling machine grinding machine and milling machine.
- Practice may be given in the operations of special machines.
- The safety precautions may be written on a chart and exhibited.
- Industrial visits may be arranged to manufacturing units.

Reference:

- Elements of Workshop Technology By S.K Hajra Choudhury, A.K Hajra Choudhury & Nirjhar Roy Volume I & II, Media promoters & Publishers (P) Ltd.
- A Text book of workshop Technology, R. S. Khurmi & J. K. Gupta, S.Chand & Co., Ram Nagar, New Delhi.
- A Text book of Foundry Technology, O.P.Khanna, Dhanpat Rai Publications(P) Ltd.
- A Text book of Production Technology, O.P.Khanna, M.Lal, Dhanpat Rai Publications(P) Ltd.

Web-based/online resources:

- <https://testbook.com/mechanical-engineering/planer-machine>
- <https://pathakmachines.com/shaper-machine-working-principle-different-types-operations-and-much-more-explained/>
- <https://engineering.myindialist.com/2009/principle-and-working-of-drilling-machine/>
- <https://themechanicalengineering.com/milling-machine/>

LIST OF EQUIPMENTS (for a batch of 30 students)

1.	Surface grinding machine	- 01
2.	Milling M/C	- 02
3.	Drilling M/C	- 02



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

V SEMESTER



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023

1027235110	FIRST AID AND FIRE SAFETY	L	T	P	C
Theory		3	0	0	3

Introduction:

A regular physician may not be available in every ship. There is every likely hood of getting injuries when people work in ship. Hence a basic knowledge of first aid is necessary for every person who works on board ship. Fire is a major hazard in ship. When the ship is sailing in mid sea help cannot be expected from outside sources. Hence a mariner should have knowledge about the types of fire, occurrence of fire and the methods of fire fighting.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about wounds, burns, shocks, poisoning and chocking.
- Study about different heart problems and their first aid.
- Have enough knowledge and information about vomiting and diarrhea.
- Acquire broader ideas about fire.
- Understand the use of fire fighting equipments.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about fractures and wounds.
- CO2: Know about poisoning, shock and unconsciousness.
- CO3: Understand heart attack and stroke.
- CO4: Summarise the conditions of fire and spread of fire.
- CO5: Have an idea about fire prevention and fire detection.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	1	2	2
CO2	1	1	1	1	1	2	2
CO3	1	1	1	1	1	2	2
CO4	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus Content

1027235110	FIRST AID AND FIRE SAFETY	L	T	P	C
Theory			3	0	0
Unit I					9
Fractures – types of fracture – signs & symptoms – treatment of fracture – strains – rupture – sprains. Wounds – types of wounds – external and internal bleeding – infection. Burns and scalds – degree of burns – estimation of percentage of burns – management of serious burns and scalds – chemical burns – burns of eye – alkali burns – electrical injuries.					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

Unit II		
	<p>Poisoning – Types of poisons – drug poisoning – alcohol Poisoning – complications – management – first aid – carbon monoxide poisoning.</p> <p>Shock – Causes – signs and symptoms.</p> <p>Unconsciousness – Degree of unconsciousness – causes for unconsciousness – First aid for unconsciousness.</p> <p>Foreign bodies in the eye – management.</p>	9
Unit III		
	<p>Heart Attack – Contributing factors – signs and symptoms – first aid – cardio pulmonary resuscitation.</p> <p>Stroke – Contributing factors – signs and symptoms – first aid.</p> <p>Choking – Signs and symptoms – first aid - Heimlich’s maneuver.</p> <p>Diarrhea, vomiting and dehydration – signs and symptoms – first aid.</p>	9
Unit IV		
	<p>Theory of Fire:</p> <p>Conditions of fire – fire triangle – fire tetrahedron – principles of fire fighting – starvation – smothering – cooling.</p> <p>Fire hazards and spread of fire:</p> <p>Sources of heat energy – hazards of fire onboard ships – methods of propagation of fire.</p> <p>Classification of fires and appropriate extinguishing agents – personnel safety procedures – fire patrol – fire control station – fires on ships in port.</p>	9
Unit V		
	<p>Fire prevention:</p> <p>Fire prevention principles – ship construction arrangements – non-combustible material – a standard fire test – A class divisions – B class divisions – C class divisions.</p> <p>Safe practices:</p> <p>Smoking – electrical equipments and other fittings – laundry and wet clothing – spontaneous combustion – machinery spaces – galleys – hot work.</p> <p>Fire detection:</p> <p>General requirements – heat detectors – smoke detectors – flame detectors.</p>	9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

TOTAL HOURS	45
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Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Online MCQ shall be conducted for each unit.
- Presentation and Seminar can be conducted.
- Fire drill may be practiced.
- Practice of first aid may be practiced with a first aid kit.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Anatomy by Chaurasia.
- Gross Anatomy by Shaw
- *Seamanship Primer by Capt. J.Dinger*, Bhandarkar Publishing.

Web-based/online resources:

- <https://www.redcross.org/take-a-class/first-aid/first-aid-training>
- <https://www.nsc.org/safety-training/first-aid>
- <https://www.nistglobal.com/fire-fighting.php>
- <https://www.fireengineering.com/firefighter-training/>



1027235230	MARINE AUXILIARY MACHINERY	L	T	P	C
Practicum		3	0	2	4

Introduction:

The students have learned about marine diesel engines in the previous semester. It should be noted that the main engine need the support of auxiliary machineries. The engineers are responsible for the repair and maintenance of all auxiliary machineries onboard the ship. Hence a basic knowledge about the working of auxiliary machineries is required.

Course objectives:

The objective of this course is to enable the student to

- Understand about the fresh water system, oil water separator deck machinery.
- Know about the working of steering machineries.
- Study about incinerator, sewage plant, pumps and purifiers.
- Acquire broader ideas about refrigeration and air conditioning plants in ships.
- Understand about piping system and vibration.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about different deck machinery used in ships.
- CO2: Know the blowers and steering system used in ships.
- CO3: Understand the ship board equipments.
- CO4: Summarise the refrigeration system in ships.
- CO5: Have an idea about the piping systems in ships.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	3	2	3	3
CO2	2	2	3	3	2	3	3
CO3	2	2	3	3	2	3	3
CO4	2	2	3	3	2	3	3
CO5	2	2	3	3	2	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Any Two Units)	Written Test Theory (Another Two Units)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2, Assessment written test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should answer Five questions.

Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim / Apparatus required	10
B	Procedure / Observation	15
C	Performance / Work	25
D	Result / Graph	10
E	Practical document (All Practicals)	30
F	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

- 18.
- 19.
- 20.

Syllabus Contents

1027235230		MARINE AUXILIARY			
Practicum		L	T	P	C
		3	0	2	4
Unit I	Fresh Water System, oily bilge separators, Deck Machinery				
Evaporators: Construction and operation of boiling type and flash type evaporators – fresh water generator and Domestic water treatment plant. Pollution prevention oily bilge separators their construction and operation – oil content monitoring system — type of deck machinery used in ships – winch – windlass – derricks – cranes their requirements operation and maintenance.					9
Ex.1. Study of crane operation.					6
Unit II	Blowers and Compressors, Steering System and Valves				
Construction and operation of Blowers and compressors used on board ships - uses of compressed air - steering gears - Construction and operation of 2-RAM steering system, 4-RAM steering system – bypass valve and pressure relief valve used in steering system - rotary vane steering system - under water fittings - propellers, rudder, bow thrusters - maintenance of hull.					9
Valves – screw valve – gate valve – globe valve – quick closing valve					
Ex.2 Study of valve operation.					6
Unit III	Ship board equipments, Pumps and Purifiers				
Incinerators – chemical sewage treatment plant – biological sewage treatment plant - Engine room crane - Different types of ship stabilizer - Different types of bearings used for marine machineries.					9
Pumps used in ships - centrifugal pump –reciprocating pump - gear pumps – screw pump - axial flow pump – purifiers					
Ex.3. Study of engine room crane operation.					6



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Unit IV	Marine Refrigeration, Ventilation, Heat exchangers	
	Vapour compression system - vapour absorption system - properties of refrigerant - Control of temperature in various rooms in Cargo or domestic plants – Ventilation necessity – control in Humidity in Air Conditioning plants - operation and maintenance of Air Conditioning plants - control and safety equipment in Air Conditioning plants – heat exchangers (shell & tube and plate type).	9
	Ex.4. Study of derrick operation.	6
Unit V	Piping system and Vibration	
	Piping Systems – fire main systems – fixed Carbon dioxide system - fresh water systems – sea water systems - fuel oil systems - lubricating oil systems – main steam systems – Bilge systems – overflow arrangement and vents. Vibration – source of vibration. Noise – noise suppression techniques – noise level measurement.	9
	Ex.5. Study of chain block working.	6
TOTAL HOURS		75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of charts of different auxiliary machineries may be given to students.
- Practice may be given in dismantling and assembling of ship machineries.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Marine Auxiliary Machinery by Mc. George.
- Marine Auxiliary Machinery by Smith.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Web-based/online resources:

- <https://marine-offshore.bureauveritas.com/finding-right-machinery-maintenance-system-ship-owners>
- <https://www.suiscagroup.com/en/noticias/ship-maintenance-plan/>
- <https://www.tandfonline.com/doi/full/10.1080/20464177.2023.2180831>

LIST OF EQUIPMENTS (for a batch of 30 students)

1. Crane model	- 1 No
2. Valves	- 1 No
3. Engine room crane model	- 1 No
4. Derrick model	- 1 No
5. Chain block	- 1 No



1027235331	MARINE ENGINEERING DRAWING	L	T	P	C
Practicum		2	0	2	3

Introduction:

Manufacturing of various machine parts and production of various equipments in small scale to big scale industries start from the basic drawing of components. The assembly of components is also carried out from the drawing. So drawing is an important subject to be studied by supervisor cadre students to carry and complete the production and assembly process successfully.

Course objectives:

The objective of this course is to enable the student to

- Appreciate the need for sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Appreciate the importance of fits and tolerance.

Course outcomes:

On successful completion of this course, the student will be able to

CO1: Learn the sections in drawing.

CO2: Know the limits, fits and tolerances.

CO3: Understand the surface texture.

CO4: Learn about keys and fasteners.

CO5: Have an idea about screws and bolts.

Pre-requisites:

Knowledge of basic science.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	1	2	2
CO2	3	3	3	3	1	2	2
CO3	3	3	3	3	1	2	2
CO4	3	3	3	3	1	2	2
CO5	3	3	3	3	1	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (half of theory portion)	Written Test Theory (another half of theory portion)	Practical Test (All exercises)	Written Test (complete portion)	Written Examination (complete portion)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2 Assessment written test should be conducted for half portions as below.

PART A: (10 X 5 Marks = 50 Marks).

Twelve questions will be asked, students should answer Ten questions.

- **CA 3:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Drawing sheets should be maintained for every drawing exercise immediately after completion of the practice. Drawing sheets should be submitted for the practical test. Each exercise should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Dimensions	10
B	Bill of materials	10
C	Drawing	40
D	Drawing sheets (All exercises)	30
E	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

END SEMESTER QUESTION PATTERN – THEORY EXAM

Duration: 3 Hours.

Max. Marks: 100

Part A – 5 Marks questions. (8 X 5 = 40 Marks)

10 questions will be asked, students will have to answer any 8 questions.

Part B – 60 Marks. (1 X 60 = 60 Marks)

Part B has one question with subdivisions A and B. Student will have to answer either A or B.

Subdivisions A and B are assembly drawings.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Syllabus Contents

1027235331	MARINE ENGINEERING	L	T	P	C
Practicum	DRAWING	2	0	2	3
<p>Theory:</p> <p>Review of sectioning – Conventions showing the section – symbolic representation of cutting plane - types of section – full section – half section – offset section – revolved section – broken section – removed section – thin section.</p> <p>Tolerances – Allowances – Unilateral and Bilateral tolerances. Limits – Methods of tolerances – Indication of tolerances on linear dimension of drawings – Geometrical tolerances – application – Fits – Classifications of fits – Selection of fits – examples.</p> <p>Surface texture – importance – controlled and uncontrolled surfaces – Roughness – Waviness – lay – Machining symbols.</p> <p>Types of fasteners – temporary fasteners – keys – classification of keys – Heavy duty keys – light duty keys. Screw thread – Nomenclature – different types of thread profiles – threads in sections.</p> <p>Threaded fasteners – bolts – nuts – through bolt – tap bolt, stud bolt – set screw – cap screws – machine screws – foundation bolts.</p>				30	
<p>Drawing:</p> <p>Draw the assembled views of the given machine elements in the drawing sheet with dimensions.</p> <ol style="list-style-type: none"> 1. Spigot & cotter joint 2. Protected type flanged coupling 3. Universal coupling 4. Engine connecting rod 5. Screw jack 6. Plummer block 					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

7. Feed check valve 8. Rams bottom safety valve 9. Stop valve 10. Blow off cock	
Practical : (Practice assembly drawing of following components) Ex No: 01 Spigot & cotter joint Ex No: 02 Protected type flanged coupling Ex No: 03 Universal coupling Ex No: 04 Engine connecting rod Ex No: 05 Screw jack Ex No: 06 Plummer block Ex No: 07 Feed check valve Ex No: 08 Rams bottom safety valve Ex No: 09 Stop valve Ex No: 10 Blow off cock	30
TOTAL HOURS	60

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Get the component parts and correlate it with the drawings.
- Practice may be given in dismantling and assembling of the components machineries.
- Learn about different types of keys.
- Understand the design of screw threads.
- Study the industrial usage of limits, fits and tolerances.

Reference:

- Machine Drawing by P.S. Gill, Katsan Publishing House, Ludiana.



- A Text book of Engineering Drawing by R.B. Gupta, Satya Prakasan – Technical India Publications, New Delhi.
- Mechanical Draughtsman ship by G.L. Tamta, Dhanpat Rai & Sons, Delhi.
- Geometrical and Machine Drawing by N.D. Bhatt.
- Engineering Drawing by D.N. Ghose, Dhanpat Rai & Sons, Delhi.

Web-based/online resources:

- https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/
- <https://fractory.com/engineering-drawing-basics/>
- <https://www.makeuk.org/insights/blogs/how-to-read-engineering-drawings-a-simple-guide>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027235332	PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES	L	T	P	C
Practicum		2	0	2	3

Introduction:

Every marine engineer should know about personal safety and social responsibilities. He should get more knowledge about personal safety equipments and emergency drill. Knowledge about pollution free environment and safety of life at sea is necessary.

Course objectives:

The objective of this course is to enable the student to

- Understand the important of emergency drill
- Acquire broad ideas about personal safety equipments.
- Understand the enclosed space entry & work.
- Acquire knowledge about maintenance of safety devices.
- Gain knowledge about marine pollution.
- Understand ISM and PSC inspections.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the types of emergencies.
- CO2: Know the personal safety equipments.
- CO3: Understand the enclosed spaces in ships.
- CO4: Summarise the safety and accident prevention methods in ships.
- CO5: Have an idea about marine pollution.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	1	1	3	3	2
CO2	3	2	3	3	3	2	2
CO3	2	2	3	2	3	3	2
CO4	3	3	3	2	3	3	2
CO5	3	2	3	2	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Any Two Units)	Written Test Theory (Another Two Units)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2, Assessment written test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should answer Five questions.

Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim / Apparatus required	10
B	Procedure / Observation	15
C	Performance / Work	25
D	Result / Output	10
E	Practical document (All Practicals)	30
F	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

- 18.
- 19.
- 20.

Syllabus Contents

1027235332		PERSONAL SAFETY AND			
Practicum		SOCIAL RESPONSIBILITIES			
		L	T	P	C
		2	0	2	3
Unit I	EMERGENCIES AND DRILLS				
Emergency – types of emergency – main engine – steering gear failure – collision – flooding – man overboard – action to be taken in the event of emergency – muster list – muster station – fire station – boat station					6
Drills – fire drill – survival craft drills – rescue drill.					
Ex.1. Practice of fire drill.					6
Ex.2. Preparation of muster list and duties.					
Unit II	PERSONAL SAFETY EQUIPMENTS				
Protective clothing and equipment – Boiler suit – head protection – safety helmets – hearing protection – face and eye protection – respiratory protective equipment – respirators – breathing apparatus – hand and foot protection – gloves – footwear – protection from falls.					6
Ex.3. Wearing procedure of safety equipments					6
Ex.4. Preparation of protection from falls.					
Unit III	ENCLOSED SPACE				
Enclosed spaces – identifying potential hazards – testing for oxygen deficiency – testing for flammable gases and vapours.					6
Precautions for entry of enclosed space – before and after – precaution against fire and explosion – precaution to be taken during work in cargo spaces – precaution to be taken in machinery space.					
Ex.5. Oxygen deficiency test in enclosed space.					6
Ex.6. Preparation of enclosed space entry permit before and after.					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Unit IV	SAFETY AND ACCIDENT PREVENTION	
MAINTENANCE OF SAFETY DEVICES		
Testing and maintaining of life boat engine – Testing and maintaining of fixed fire fighting installations – Testing and maintaining of portable extinguishers – statutory regulations regarding maintenance of breathing apparatus		6
ACCIDENT CAUSES AND PREVENTION		
Accident causes and prevention in engine room – scavenging fire - metal fire in boiler – battery room – main switch board.		
Ex.7. Testing and maintenance of portable fire extinguisher		6
Ex.8. Practice the use of breathing apparatus		
Unit V	Pollution	
Pollution – Common causes of pollution – impact of pollution on marine life – measures to prevent pollution – marine pollution – oil record book part 1 – oil record book part 2 – double hull design – SOPEP locker – disposal of noxious substances – disposal of sewage – disposal of garbage – control of air pollution – emission control.		6
Ex.9. Preparation of oil record book		6
TOTAL HOURS		60

Suggested list of students’ activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of different types of ship models may be given as mini project to students.
- Practice may be given in dismantling and assembling of ship machineries.
- Fire drill may be practiced.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Ship board operation H.I.Lavery, British library cataloguing.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- SOLAS IMO publications
- MARPOLE 73 / 78, IMO
- Ship safety and environmental protection, Vikram Gokhale, N. Nanda, N.G. Engineering publications

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



1027235333	RULE OF THE ROAD	L	T	P	C
Practicum		2	0	2	3

Introduction:

For safe navigation of the ship certain rules have been implemented. Every marine engineer should know about the international rules and regulations that are being followed in the shipping industry. Enough knowledge about the maintenance of equipments is also required.

Course objectives:

The objective of this course is to enable the student to

- Understand about the risk of collision and action to avoid collision
- Know about the maneuvering of ships.
- Study about different types of signals.
- Acquire broader ideas about the guidelines of IMO and other authorities.
- Understand about lighthouse authorities and marks.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Elucidate about the actions and responsibilities at different situations.
- CO2: Know the traffic rules and maneuvering methods used in ships.
- CO3: Understand the signal and bells in ships.
- CO4: Summarise IMO guidelines.
- CO5: Have an idea about the lighthouse authorities and marks.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	1	3	3	2
CO2	3	2	3	2	3	3	2
CO3	1	3	1	2	2	3	1
CO4	3	2	3	3	3	2	3
CO5	1	3	2	2	3	1	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test Theory (Any Two Units)	Written Test Theory (Another Two Units)	Practical Test (All Exercises)	Written Test (Complete Theory Portions)	Written Examination (Complete Theory Portions)
Duration	2	2	3	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	6th Week	12th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** Assessment written test should be conducted for 50 Marks. The marks scored will be converted to 10 Marks for each test. Best one will be considered for the internal assessment of 10 Marks. CA1 and CA2, Assessment written test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should answer Five questions.

Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

- **CA 3:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 15 Marks for the internal mark. Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. Each exercise/experiment should be evaluated for 10 Marks. The total marks awarded should be converted to 30 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION - Practical Test

Sl.No.	Description	Marks
A	Aim / Apparatus required	10
B	Procedure / Observation	15
C	Performance / Work	25
D	Result / Output	10
E	Practical document (All Practicals)	30
F	Viva Voce	10
Total		100

CA4: Model examination should be conducted for complete theory portions as per the end semester question pattern. The marks awarded should be converted to 15 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

- 18.
- 19.
- 20.

Syllabus Contents

1027235333		RULE OF THE ROAD			
Practicum					
		2	0	2	3
Unit I	ACTIONS AND RESPONSIBILITIES AT DIFFERENT SITUATIONS				
Theory		6			
Look-out – Safe speed – Risk of collision – Action to avoid collision – Narrow channels – Traffic separation schemes – sailing vessels – Overtaking – Head-On Situation – Crossing Situation –Light and shapes – Definitions – Visibility of Lights – Power-driven vessels underway – Towing and Pushing – Sailing vessels underway and vessels under oars – Fishing vessels.					
Practical		6			
Ex No: 01 Demonstration and study of lights and shapes. Ex No: 02 Demonstration and study about positioning of lights and shapes.					
Unit II	TRAFFIC REGULATIONS AND MANEUVERING				
Theory		6			
Sound and light signals – Equipment for sound signals – Maneuvering and warning signals - sound signals in restricted visibility – Signals to attract attention – Distress signals – Exemptions – Positioning and Technical details of lights and shapes – Definition – Vertical Positioning and spacing of lights – Horizontal positioning and spacing of Lights.					
Practical		6			
Ex No: 03 Demonstration and study of towing and pushing. Ex No: 04 Demonstration and study of sound and light signals.					
Unit III	SIGNALS AND BELLS				
Theory		6			
Technical details of sound signal alliances – whistles – Frequencies and range of audibility – Limits of fundamental frequencies – Sound signal intensity and range of audibility – Positioning of whistles – Fitting of more than one whistle – combined whistle systems –					



Bell or gong – intensity of signal – Construction – Approval – Distress signals.		
Practical Ex No: 05 Demonstration and study of semaphore signal. Ex No: 06 Demonstration and study of international code of signals.		6
Unit IV	IMO GUIDELINES	
Theory I.M.O. Guidance for the uniform application of certain rules of the 1972 collision regulations –Clarification on the use of inshore traffic zones by small vessels –Basic Principles to be observed in keeping a navigational watch – Fitness for duty - Navigation – Look-out – Navigation with pilot embarked – Protection of the marine environment.		6
Practical Ex No: 07 Demonstration and study about risk of collision. Ex No: 08 Demonstration and study about action to avoid collision.		6
Unit V	LIGHTHOUSE AUTHORITIES AND MARKS	
Theory International Association of lighthouse authorities maritime buoyage system – Lateral Marks – Cardinal Marks – isolated danger mark – safe water marks – Special Marks – New dangers – Maritime buoyage system rules – Scope – Type of marks – Method of characterizing marks – Conventional direction of buoyage – Buoyage Regions.		6
Practical Ex No: 09 Demonstration and study of different types of buoyage. Ex No: 10 Demonstration and study of different types of marks.		6
TOTAL HOURS		60

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of different types of ship models may be given as mini project to students.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Practice may be given in dismantling and assembling of ship machineries.
- Fire drill may be practiced.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- *Seamanship Primer by Capt. J.Dinger*, Bhandarkar Publishing.
- *Survival in Life boat and life raft* by Capt. S.K. Puri.
- *Survival at sea, the life boat and life raft* by C.H. Wright.
- *Ship board operation* by H.I. Lavery, British library cataloguing.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>

LIST OF EQUIPMENTS (for a batch of 30 students)

- | | |
|---|--------|
| 1. Navigational lights and shapes. | - 1 No |
| 2. Navigational sound and light signals | - 1 No |
| 3. Different types of buoyage | - 1 No |
| 4. Semaphore signals | - 1 No |



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027235440	FIRE FIGHTING	L	T	P	C
Practicum		1	0	4	3

Introduction:

Fire is a major hazard in ship. When the ship is sailing in mid sea help cannot be expected from outside sources. Hence a mariner should have knowledge about the types of fire, occurrence of fire and the methods of fire fighting.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about different fire fighting equipments.
- Learn the working of portable extinguishers.
- Familiarise with the fixed fire fighting installations.
- Understand the working of different types of fire detectors.
- Have a basic information about the safety equipments used during fire fighting.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Elucidate about the different fire fighting equipments.
- CO2: Know the working of portable extinguishers.
- CO3: Understand the fixed fire fighting installations.
- CO4: Summarise the working of different types of fire detectors.
- CO5: Have an idea about the safety equipments used during fire fighting.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	3	3	3	2
CO2	2	2	3	3	1	3	1
CO3	2	2	3	3	1	3	1
CO4	3	3	3	3	2	1	2
CO5	2	3	3	1	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus Contents

1027235440	FIRE FIGHTING	L	T	P	C
Practicum		1	0	4	3
Unit I					
Theory	Water sprinkler fixed fire fighting installations - water type portable extinguishers.				3
Practical	Ex No: 01 Demonstration and study about the construction and working of water sprinkler fixed fire fighting installations. Ex No: 02 Demonstration and study about the construction and working of water type portable extinguishers.				12
Unit II					
Theory	Mechanical foam type portable extinguishers - dry chemical powder type portable fire				3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

extinguishers.	
<p>Practical</p> <p>Ex No: 03 Demonstration and study about the construction and working of mechanical foam type portable extinguishers.</p> <p>Ex No: 04 Demonstration and study about the construction and working of dry chemical powder type portable fire extinguishers.</p>	12
Unit III	
<p>Theory</p> <p>Carbon dioxide type portable fire extinguishers - fire detectors.</p>	3
<p>Practical</p> <p>Ex No: 05 Demonstration and study about the construction and working of carbon dioxide type portable fire extinguishers.</p> <p>Ex No: 06 Demonstration and study about the construction and working of fire detectors.</p>	12
Unit IV	
<p>Theory</p> <p>Fire man outfit - emergency fire pumps, hoses and nozzles.</p>	3
<p>Practical</p> <p>Ex No: 07 Demonstration and study about the use of fire man outfit.</p> <p>Ex No: 08 Demonstration and study about the construction and working of emergency fire pumps, hoses and nozzles.</p>	12
Unit V	
<p>Theory</p> <p>Breathing apparatus - fire blankets.</p>	3
<p>Practical</p> <p>Ex No: 09 Demonstration and study about the construction and working of breathing apparatus.</p> <p>Ex No: 10 Demonstration and study about the use of fire blankets.</p>	12
TOTAL HOURS	75



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Prepare cut sections of different types portable extinguishers.
- Prepare a chart for the usage of portable extinguishers for different types of fires.
- Fire drill may be practiced.
- Connect a fire hydrant to the fire pump and demonstrate the fire hose and nozzle.

Reference:

- Introduction to Marine Engineering by D.A.Taylor.
- *Seamanship Primer* by Capt. J.Dinger, Bhandarkar Publishing.
- Branch's Elements of Shipping by Alan Edward Branch, Michael Robarts.
- Reeds Vol 5: Ship Construction for Marine Engineers by Paul Anthony Russell, E.A.Stokoe.
- Marine Engineering by Roy L.Harrington.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027235541	SHIP MACHINERY	L	T	P	C
Practicum		1	0	4	3

Introduction:

The students have learned about marine diesel engines in the previous semester. It should be noted that the main engine need the support of auxiliary machineries. The engineers are responsible for the repair and maintenance of all auxiliary machineries onboard the ship. Hence a basic knowledge about the working of auxiliary machineries is required.

Course objectives:

The objective of this course is to enable the student to

- Dismantling and assembling of winch.
- Dismantling and assembling of oily bilge separator.
- Dismantling and assembling of centrifugal pump.
- Dismantling and assembling of reciprocating pump.
- Dismantling and assembling of gear with reciprocating pump.
- Dismantling and assembling of purifier.
- Practice of chipping and painting of corroded parts.
- Dismantling and assembling of compressor.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about winch and oily bilge separator.
- CO2: Know the centrifugal pump and reciprocating pump.
- CO3: Understand the assembling of gear with reciprocating pump and purifier.
- CO4: Know chipping and painting and assembling of compressor.
- CO5: Have an idea about the vapour compression system and fire main system.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	3	2	2
CO2	3	3	3	3	3	2	2
CO3	3	3	3	3	3	2	2
CO4	3	2	2	2	3	2	2
CO5	3	2	2	2	2	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15
C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus Contents

1027235541		SHIP MACHINERY			
Practicum					
		1	0	4	3
Unit I					
Theory					
Types of deck machinery used in ships – winch – windlass – derricks – cranes their requirements operation and maintenance – oily bilge separator.		3			
Practical					
Ex No: 01 Dismantling and assembling of winch.		12			
Ex No: 02 Dismantling and assembling of oily bilge separator.					
Unit II					
Theory					
Pumps used in ships - centrifugal pump –reciprocating pump - gear pumps – screw pump –		3			



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

axial flow pump.	
Practical Ex No: 03 Dismantling and assembling of centrifugal pump. Ex No: 04 Dismantling and assembling of reciprocating pump.	12
Unit III	
Theory Bilge level maintenance – bilge transfer from bilge tank - bilge pump (gear with reciprocating) – purifiers (lube oil and fuel oil).	3
Practical Ex No: 05 Dismantling and assembling of gear with reciprocating pump. Ex No: 06 Dismantling and assembling of purifier.	12
Unit IV	
Theory Chipping hammer – wire brush – painting brush and roller – anti corrosion paints - Construction and operation of Blowers and compressors used on board ships - uses of compressed air.	3
Practical Ex No: 07 Practice of chipping and painting of corroded parts. Ex No: 08 Dismantling and assembling of compressor.	12
Unit V	
Theory Vapour compression system - Refrigerants used in marine practice - properties of refrigerant - fire main system and accessories.	3
Practical Ex No: 09 Study of vapour compression system. Ex No: 10 Operation of fire main system	12
TOTAL HOURS	75



Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of different types of ship models may be given as mini project to students.
- Practice may be given in dismantling and assembling of ship machineries.
- Fire drill may be practiced.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Marine Auxiliary Machinery by Mc. George.
- Marine Auxiliary Machinery by Smith.

Web-based/online resources:

- <https://marine-offshore.bureauveritas.com/finding-right-machinery-maintenance-system-ship-owners>
- <https://www.suiscagroup.com/en/noticias/ship-maintenance-plan/>
- <https://www.tandfonline.com/doi/full/10.1080/20464177.2023.2180831>

LIST OF EQUIPMENTS (for a batch of 30 students)

6. Winch	- 1 No
7. Oily bilge separator	- 1 No
8. Centrifugal pump	- 1 No
9. Reciprocating pump	- 1 No
10. Gear with reciprocating pump	- 1 No
11. Purifier	- 1 No
12. Chipping and painting	- 1 No
13. Air compressor	- 1 No



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027235542	COMPUTER AIDED MARINE ENGINEERING DRAWING	L	T	P	C
Practicum		1	0	4	3

Introduction:

The advancements in technology have made engineering drawing much easier by the use of computers. The marine engineering drawing which is drawn in drawing sheets in the drawing hall need to be fed to the computer. The student will appreciate the simplicity and accuracy in the use of computer.

Course objectives:

The objective of this course is to enable the student to

- Introduction to CAD software
- Drawing aids and editing commands
- Basic dimensioning, hatching, blocks and views
- Isometric drawing, printing and plotting
- CAD drawing practice

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn the applications of CAD software.
- CO2: Know the drawing aids and editing commands of CAD software.
- CO3: Understand the dimensioning and hatching of CAD software.
- CO4: Know the isometric drawing in CAD software.
- CO5: Have an idea about printing and plotting in CAD software.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	1	3	3	3
CO2	3	2	3	1	3	3	3
CO3	3	2	3	1	3	3	3
CO4	3	2	3	1	3	3	3
CO5	3	2	3	1	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim / Procedure	5
B	CAD command	15
C	Diagram	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions.	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions.	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim / Procedure	5



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

B	CAD command	20
C	Diagram	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions. Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions. Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus Contents

1027235542	COMPUTER AIDED MARINE ENGINEERING DRAWING	L	T	P	C
Practicum			1	0	4
Theory		15			
<p>Introduction – History of CAD – Applications – Advantages over manual drafting – Hardware requirements – Software requirements – Windows desktop – CAD screen interface – menus – Tool bars – How to start CAD – How to execute command – types of co-ordinate systems – Absolute – Relative – Polar.</p> <p>Creating objects (2D) – Using draw commands – Line, Arc, Circle, Ellipse, Donut, Polygon, Point, Pline, Sketch, Trace – Creating 2D Solid. Creating text – Dtext, Mtext, Text styles – Mline, spline – Drawing with precision – Osnap options – drafting settings – limits – Units – drawing aids – Fill, Snap, Grid, Ortho lines – Function keys – Editing and modify commands – Object selection methods – Erasing object – Oops – Cancelling and</p>					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

<p>undoing a command – Copy – Move – Array – Offset – Scale – Rotate – Mirror – Break – Trim – Extend – Explode – Divide – Measure – stretch – Lengthen – Changing properties – Color – line types – LT scale – Matching properties – Editing with grips – Pedit – Ddedit – Mledit.</p> <p>Basic dimensioning – Editing dimensions – Dimension styles – Dimension system variables – Machine drawing with CAD – Creation of blocks – Wblock – inserting a block – Block attributes – Hatching – Pattern types – Boundary hatch – working with layers – Controlling the drawing display – Blipmode – View group commands – Zoom, redraw, regen, regenauto, pan, viewres – Real time zoom – Inquiry groups – calculating area – Distance – Time – Status of drawing – Using calculator.</p> <p>Isometric drawing – Isometric projection – drawing isocircles – Dimensioning isometric objects – File commands – File Import and export – plotting drawing – external references – 3D fundamentals – 2D to 3D Conversion – 3D Drawing – 3D Primitives – Extrude – Revolve – Slice – Section – Surface 3D Mesh 3D – Surface 3D Operation – Solid Editing.</p>	
CAD DRAWING PRACTICE	
<p>Detailed drawings of following machine parts are given to students to assemble and draw the sectional or plain elevations / plans / and side views with dimensioning and bill of materials using CAD Software.</p>	
<p>Practical</p> <ol style="list-style-type: none"> 1. Spigot & cotter joint 2. Knuckle joint 3. Protected type flanged coupling 4. Universal coupling 5. Connecting rod 6. Feed check valve 7. Blow off cock <p>3D Drawing</p> <ol style="list-style-type: none"> 1. Geneva wheel 2. Machined block 	60



3. Square head bolt and nut 4. Piston and piston rings	
Note: Take the orthographic view and sectional view from the above assembled 3D drawing.	
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Prepare the views of ships or machineries used in ships using CAD software.
- Prepare the list of editing commands in a chart.
- Get information about other design softwares and their advantages.

Reference:

- AutoCAD & AutoCAD LT All-in-One Desk Reference For Dummies by David Byrnes.
- Practical Autodesk AutoCAD 2021 and AutoCAD LT 2021 by Yasser Shoukry.
- Introduction to AutoCAD 2020. A Modern Perspective by Paul F. Richard.
- Discovering AutoCAD 2020 by Mark Dix.

Web-based/online resources:

- <https://www.autodesk.in/solutions/cad-drawing-apps-and-software>
- <https://www.wikihow.com/Set-up-an-AutoCAD-Drawing>
- <https://www.smartdraw.com/cad/cad-drawing.htm>



1027235543	NAVIGATIONAL AND METEOROLOGICAL INSTRUMENTS	L	T	P	C
Practicum		1	0	4	3

Introduction:

Diploma holders in marine engineering are expected to work on board ship. So they should have knowledge about the basic navigational equipments and metrological equipments. Persons working in shipyards also need to have basic knowledge about these equipments. Any person working on board ship should have basic knowledge about navigational equipments. The weather at sea will be changing frequently. So a sailor should have knowledge about meteorological equipments also.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about sextant, magnetic compass and gyro compass.
- Learn the working of echo-sounder, walkie- talkie and radar.
- Familiarise with Nav-tex, global positioning system and line throwing apparatus.
- Understand the rain gauge, anemometer and thermometer (wet bulb and dry bulb).
- Have a basic information about barometer, hygrometer and hydrometer.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Understand about sextant, magnetic compass and gyro compass.
- CO2: Know the working of echo-sounder, walkie- talkie and radar.
- CO3: Learn the working of Nav-tex, global positioning system and line throwing apparatus.
- CO4: Acquire knowledge about rain gauge, anemometer and thermometer (wet bulb and dry bulb).
- CO5: Have an idea about barometer, hygrometer and hydrometer.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	3	3	2	2
CO2	2	2	3	3	3	2	2
CO3	2	2	3	3	3	2	2
CO4	2	2	3	3	3	2	2
CO5	2	2	3	3	3	2	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions.	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions.	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions. Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions. Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus Content

1027235543	NAVIGATIONAL AND	L	T	P	C
Practicum	METEOROLOGICAL INSTRUMENTS	1	0	4	3
Theory					
Navigational instruments Sextant, magnetic compass, gyro compass, echo-sounder, walkie- talkie, radar, Nav-tex, global positioning system, line throwing apparatus		15			
Meteorological instruments Rain gauge, anemometer, thermometer (wet bulb and dry bulb), barometer, hygrometer, hydrometer					
Practical					
Navigational instruments Ex No: 01 Study about the construction and working of sextant. Ex No: 02 Study about the construction and working of magnetic compass. Ex No: 03 Study about the construction and working of gyro compass. Ex No: 04 Study about the construction and working of echo-sounder. Ex No: 05 Study about the construction and working of walkie- talkie. Ex No: 06 Study about the construction and working of radar. Ex No: 07 Study about the construction and working of nav-tex. Ex No: 08 Study about the construction and working of global positioning system.		60			



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Ex No: 09 Study about the construction and working of line throwing apparatus.	
Meteorological instruments	
Ex No: 10 Study about the construction and working of rain gauge.	
Ex No: 11 Study about the construction and working of anemometer.	
Ex No: 12 Study about the construction and working of thermometer (wet bulb and dry bulb)	
Ex No: 13 Study about the construction and working of barometer.	
Ex No: 14 Study about the construction and working of hygrometer.	
Ex No: 15 Study about the construction and working of hydrometer.	
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of charts for navigational and meteorological instruments.
- Practice may be given in dismantling and assembling of navigational and meteorological instruments.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Munro's Navigation By Capt G.E. Earl and Capt F.L. Main.
- Marine Meteorology By Capt. H.Subramanian.

Web-based/online resources:

- <https://www.nationalgeographic.org/encyclopedia/navigation/>
- <https://www.seably.com/courses/an-introduction-to-navigation-basics>
- <https://www.discoverboating.com/resources/marine-navigation-how-to-navigate-a-boat>

LIST OF EQUIPMENTS (for a batch of 30 students)

- | | |
|----------------------|--------|
| 1. Sextant. | - 1 No |
| 2. Magnetic compass. | - 1 No |



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- | | |
|---|---------|
| 3. Gyro compass. | - 1 No |
| 4. Echo-sounder. | - 1 No |
| 5. Walkie- talkie. | - 1 Set |
| 6. Radar. | - 1 No |
| 7. Nav-tex. | - 1 No |
| 8. Global positioning system. | - 1 No |
| 9. Line throwing apparatus. | - 1 No |
| 10. Rain gauge. | - 1 No |
| 11. Anemometer. | - 1 No |
| 12. Thermometer (wet bulb and dry bulb) | - 1 No |
| 13. Barometer. | - 1 No |
| 14. Hygrometer. | - 1 No |
| 15. Hydrometer. | - 1 No |



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027235654	MARINE INNOVATION AND STARTUP	L	T	P	C
Practicum		1	0	2	2

Introduction:

Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and start ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs, relevant to social prosperity and thereby ensure good means of living for every individual, provides jobs and develop Indian economy.

Course objectives:

The objective of this course is to enable the student to

- Acquire entrepreneurial quality, competency and motivation.
- Know the concept and process of entrepreneurship.
- Learn the preparation of project feasibility report.
- Understand the importance of generation of ideas and product selection.
- Have basic information about the concept of incubation and starts ups.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Acquire entrepreneurial spirit and resourcefulness.
- CO2: Learning the process and skills of creation and management of entrepreneurial venture.
- CO3: Understand the formation of E-cell.
- CO4: Familiarization of various financial and non financial schemes.
- CO5: Have an idea about the activities in harbours and shipyards.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	2	3	3
CO2	3	2	3	1	3	3	2
CO3	3	3	3	1	3	3	2
CO4	1	1	1	1	2	3	2
CO5	2	2	3	2	3	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- The students should be taught all units and proper exposure and field visit also arranged. All the portions should be completed before examinations.
- The business report should be prepared and submitted during the board examination. The same have to be evaluated for the report submission (30 marks).
- A business plan in port related activities and another business plan for shipyard related activities need to be written for examinations.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 Assessment test should be conducted for two units as below.

PART A: (10 X 2 Marks = 20 Marks).

Twelve questions will be asked; students should answer ten questions. Six questions can be asked from each unit.

PART B: (1 X 30 Marks = 30 Marks).

The students will be asked to write about the business plan in port related activities.

CA2 Assessment test should be conducted for another two units as below.

PART A: (10 X 2 Marks = 20 Marks).

Twelve questions will be asked; students should answer ten questions. Six questions can be asked from each unit.

PART B: (1 X 30 Marks = 30 Marks).

The students will be asked to write about the business plan in shipyard related activities.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

SCHEME OF EVALUATION

Model Examination and End Semester Examination - Project Exam

PART	DESCRIPTION	MARKS
A	Written Test *	60
B	Submission of business report	30
C	Viva-Voce	10
TOTAL		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

***Written Test:**

The written exam has two parts.

PART A: (10 X 2 Marks = 20 Marks).

Fifteen questions will be asked; students should answer ten questions. Three questions can be asked from each unit.

PART B: (2 X 20 Marks = 40 Marks).

Two questions will be asked. The student will have to answer both the questions.

In the first question the students will be asked to write about the business plan in port related activities.

In the second question the students will be asked to write about the business plan in shipyard related activities.

Syllabus contents

1027235654	MARINE INNOVATION AND	L	T	P	C
Practicum	STARTUP	1	0	2	2
Unit I	Entrepreneurship – Introduction				
Theory					3
● Concept, Functions and Importance					
● Myths about Entrepreneurship					
● Pros and Cons of Entrepreneurship					
● Motivation					
● Creativity					
● Innovation					
Unit II	Entrepreneurship – Process				
Theory					3
● Process of Entrepreneurship					
● Benefits of Entrepreneur					
● Entrepreneurs - as problem solvers					
● Mindset of an employee and an entrepreneur					
● Business failure – causes and remedies					
● Role of networking in entrepreneurship					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Unit III	Business – Introduction	
Theory	<ul style="list-style-type: none"> • Types of Business: Manufacturing, Trading and Services. • Stakeholders: sellers, vendors and consumers and Competitors • Types of Resources - Human, Capital and Entrepreneurial tools and resources • Selection and utilization of human resources and professionals. • Goals of business and goal setting 	3
Unit IV	Business management and banking	
Theory	<ul style="list-style-type: none"> • Patent, copyright and Intellectual property rights • Negotiations - Importance and methods • Customer relations and vendor management • Size and capital based classification of business. • Role of financial institutions • Role of Government policy • Incentive schemes from state government • Incentive schemes from central government. 	3
Unit V	Start ups and E-cell	
Theory	<ul style="list-style-type: none"> • Concept of Incubation centre. • Visit and report of DIC • Field Visit to MSME's • Visit to Incubation centers and start ups • Startup and its stages • Role of E-Cell • E-Cell to Entrepreneurship 	3
PRACTICAL		
	<u>Port related activities</u>	
	<ul style="list-style-type: none"> • Different types of cargo handling • Cargo storage places in harbour 	30



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

<ul style="list-style-type: none"> ● Cargo transfer from harbour ● Bunkering of fuel oil and lubricating oil ● Supply of emergency spares for ship machinery ● Supply of food and essentials ● Tug boat operation and related activities ● Ash and other waste collection from ship ● Renewal of life saving equipments and its certification ● Refilling of fire fighting equipments and its certification <p><u>Shipyard related activities</u></p> <ul style="list-style-type: none"> ● Understanding type of ship and its design ● Requirement of ship construction materials ● Requirement of machinery for engine room and deck ● Requirement of paints ● Requirement of electronic control units and communication devices ● Understanding the work carried out at workshops in shipyard ● Requirement of life saving devices and fire fighting equipments ● Floating the ship after construction of the ship ● Registration of ship ● Docking of ship in the yard for repair works ● External power supply to the ship in the yard 	
TOTAL HOURS	45

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Identify different cargo handling equipments.
- Preparation of different types of cargo handling equipment models may be given as mini project to students.
- Practice may be given in assembling of cargo handling equipments.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Reference:

- Introduction to Marine Engineering by D.A.Taylor.
- Seamanship Primer by Capt. J.Dinger, Bhandarkar Publishing.
- Branch's Elements of Shipping by Alan Edward Branch, Michael Robarts.
- Reeds Vol 5: Ship Construction for Marine Engineers by Paul Anthony Russell, E.A.Stokoe.
- Marine Engineering by Roy L.Harrington.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027235773	INDUSTRIAL TRAINING	Summer Vacation	C
Internship			2

Introduction

Industrial training is a crucial component of the diploma engineering curriculum, designed to bridge the gap between theoretical knowledge and practical application. Typically conducted during vacation periods, this two-week training program provides students with hands-on experience in their respective engineering fields. The primary objectives are to enhance practical skills, familiarize students with industry standards, and prepare them for future employment.

Two-week industrial training during vacation periods is an invaluable part of diploma engineering education. It not only equips students with practical skills but also provides a comprehensive understanding of the industry, preparing them for successful engineering careers.

Objectives

1. **Practical Exposure:** Students gain direct exposure to real-world engineering practices, tools, and technologies.
2. **Skill Enhancement:** The training helps in developing technical and soft skills that are essential for professional growth.
3. **Industry Insight:** Students learn about the working environment, operational procedures, and challenges faced by industries.
4. **Professional Networking:** The training offers opportunities to interact with industry professionals, which can be beneficial for career prospects.
5. **Application of Knowledge:** It allows students to apply classroom knowledge to solve practical problems, enhancing their understanding and retention of engineering concepts.

Structure of the Training Program

- **Orientation:** Introduction to the company, its operations, and safety protocols.
- **Project Assignment:** Students are assigned specific projects or tasks relevant to their field of study.
- **Supervision and Mentorship:** Industry professionals guide and mentor students throughout the training.
- **Skill Development Workshops:** Sessions on technical skills, software tools, and industry best practices.
- **Assessment and Feedback:** Performance evaluations and constructive feedback to help students improve.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Benefits for Students

- **Enhanced Employability:** Practical experience makes students more attractive to potential employers.
- **Confidence Building:** Working in a real-world setting boosts confidence and professional demeanor.
- **Clarified Career Goals:** Exposure to various roles and responsibilities helps students define their career paths.

Course Outcomes

CO 1: Demonstrate proficiency in using industrial machinery, tools, and software.

CO 2: Able to identify, analyze, and solve engineering problems using industry-standard methods and practices.

CO 3: Gain a comprehensive understanding of industrial manufacturing processes, quality control, and safety practices.

CO 4: Exhibit improved communication, teamwork, and professional behavior in an industrial setting.

CO 5: Apply theoretical concepts learned in their coursework to practical engineering tasks and projects.

Duties Responsibilities of the Faculty Mentor.

One faculty mentor should be assigned for every 30 students by the HOD / Principal. Faculty mentors shall play a crucial role in overseeing and guiding students during their industrial training program in Diploma engineering.

Pre-Training Responsibilities:

1. **Orientation and Preparation:**
 - Conduct orientation sessions to familiarize students with the objectives, expectations, and guidelines of the industrial training program.
 - Assist students in understanding the importance of industrial training in their academic and professional development.
2. **Placement Coordination:**
 - Collaborate with the placement cell or industry liaison office to secure suitable training placements for students that align with their academic specialization and career interests.
 - Facilitate communication between the institution and host organizations to ensure smooth coordination of training arrangements.
3. **Training Plan Development:**
 - Help students develop a detailed training plan outlining learning objectives, tasks, and expected outcomes for the training period.
 - Guide students in setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals for their training experience.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

During Training Responsibilities:

4. Monitoring and Support:

- Regularly monitor the progress of students during their industrial training. Maintain communication with both students and industry supervisors to track performance and address any issues that may arise.
- Provide ongoing support and guidance to students, offering advice on technical challenges, professional conduct, and workplace etiquette.

5. Technical Guidance:

- Offer technical guidance and mentorship related to the specific engineering discipline or specialization of the students. Help them apply theoretical knowledge to practical situations encountered in the industry.

6. Problem-Solving Assistance:

- Assist students in overcoming obstacles or challenges encountered during their training. Encourage them to develop problem-solving skills and resilience in real-world engineering scenarios.

7. Feedback and Evaluation:

- Provide constructive feedback on students' performance based on reports, assessments, and observations gathered from industry supervisors.
- Evaluate students' achievements in relation to their training objectives and competencies developed during the program.

Post-Training Responsibilities:

8. Reflection and Debriefing:

- Conduct debriefing sessions with students to reflect on their training experiences, discuss lessons learned, and identify areas for further improvement.
- Help students articulate their learning outcomes and how these experiences contribute to their professional growth.

9. Documentation and Reporting:

- Ensure comprehensive documentation of students' training activities, achievements, and feedback received from industry supervisors.
- Prepare reports summarizing students' performance and submit these to relevant departments or committees for review and assessment.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

10. Career Counseling:

- Provide career guidance and counseling to students based on their industrial training experiences. Assist them in leveraging these experiences for future job applications or further academic pursuits.

11. Continuous Improvement:

- Collaborate with industry partners to continuously improve the quality and relevance of the industrial training program.
- Incorporate feedback from students and industry supervisors to enhance the effectiveness of future training placements.

By fulfilling these duties and responsibilities, faculty mentors contribute significantly to the overall educational experience and professional development of Diploma engineering students during their industrial training program.

Instructions to the students

Before Starting Industrial Training:

1. Orientation and Preparation:

- Attend orientation sessions conducted by the institution or faculty mentors to understand the objectives, expectations, and guidelines of the industrial training program.
- Familiarize yourself with the specific policies, procedures, and safety regulations of the host organization where you will be undergoing training.

2. Setting Goals:

- Set clear and specific goals for your industrial training period. Define what skills, knowledge, and experiences you aim to gain during this time.
- Discuss your goals with your faculty mentor and seek their guidance in developing a training plan that aligns with your career aspirations.

3. Professional Attire and Conduct:

- Dress appropriately and professionally according to the standards of the industry and host organization.
- Maintain a positive attitude, demonstrate punctuality, and adhere to workplace etiquette and norms.

During Industrial Training:

4. Learning and Engagement:



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Actively engage in all assigned tasks and projects. Seek opportunities to learn new skills and technologies relevant to your field of study.
 - Take initiative in asking questions, seeking clarification, and participating in discussions with supervisors and colleagues.
5. Adaptability and Flexibility:
- Adapt to the work environment and demonstrate flexibility in handling various responsibilities and challenges that arise during your training.
 - Be open to different roles and tasks assigned to you, as this will broaden your experience and skill set.
6. Professionalism and Communication:
- Communicate effectively with supervisors, colleagues, and clients as required. Practice clear and concise verbal and written communication.
 - Demonstrate professionalism in all interactions, respecting confidentiality, and adhering to company policies and procedures.
7. Safety and Compliance:
- Prioritize safety at all times. Familiarize yourself with safety protocols, procedures, and emergency exits in the workplace.
 - Follow all safety guidelines and regulations to ensure your well-being and that of others around you.

After Completing Industrial Training:

8. Reflection and Documentation:
- Reflect on your training experience. Evaluate what you have learned, the challenges you faced, and how you have grown professionally.
 - Maintain a journal or log documenting your daily activities, achievements, and lessons learned during the training period.
9. Feedback and Evaluation:
- Seek feedback from your industry supervisor and faculty mentor on your performance and areas for improvement.
 - Use constructive feedback to enhance your skills and competencies for future career opportunities.
10. Career Planning:



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Use your industrial training experience to inform your career planning and decision-making process.
- Discuss your career goals and aspirations with your faculty mentor or career counselor for guidance on next steps after completing your diploma.

By following these instructions, Diploma engineering students can make the most of their industrial training experience, gain valuable insights into their chosen field, and prepare themselves effectively for future professional endeavors.

Attendance Certification

Every student has to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution faculty mentor.

Training Reports

The students have to prepare reports: The report in the form of a diary to be submitted to the concerned faculty mentor of the institution. This will be reviewed while awarding Internal assessment.

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant / product / process / construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc. should be incorporated with the consent of the Organisation.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Scheme of Evaluation

Internal Assessment

Students should be assessed for 40 Marks by industry supervisor and polytechnic faculty mentor for the Internal Assessment.

Sl. No.	Description	Marks
A	Punctuality and regularity. (Attendance)	10
B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Self expression / communication skills. Interpersonal skills / Human Relation.	10
D	Report and Presentation.	10
Total		40

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of industrial training. The marks scored will be converted to 60 marks for the End Semester Examination.

Scheme of Evaluation

Sl. No.	Description	Marks
A	Daily Activity Report and Attendance certificate.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

VI SEMESTER



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023

1027236111	NAVAL ARCHITECTURE	L	T	P	C
Theory		3	0	0	3

Introduction:

Diploma holders in marine engineering should have enough knowledge about different parts of ship. They should know about the basic principles of naval architecture. They should know how the ship floats. Basic knowledge about the area and volume is required. They should know about propellers and rudders.

Course objectives:

The objective of this course is to enable the student to

- Understand how the ship floats in water.
- Know about the basic principles of naval architecture.
- Study about position of centre of gravity of the ship.
- Acquire broader ideas about area, volume and moment.
- Understand about stability of ships.
- Study about propellers and rudder.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn the hydrostatic calculations of ship.
- CO2: Know the basic geometric concepts of ships.
- CO3: Understand the calculation of area under a curve.
- CO4: Summarise the stability of ships.
- CO5: Have an idea about propellers.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	3	2	2
CO2	3	3	3	3	3	2	2
CO3	3	3	3	2	3	3	3
CO4	3	3	3	2	3	3	3
CO5	3	2	3	3	3	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus contents

1027236111	NAVAL ARCHITECTURE	L	T	P	C
Theory		3	0	0	3
Unit I	HYDROSTATICS				
Density – relative density – Archimedes’ principle – buoyancy – floating bodies – displacement – volume of displacement – tonnage – light weight and dead weight – TPC – effect of density on draught of a ship – fresh water allowance – coefficients of form – wetted surface area.					9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Unit II	BASIC GEOMETRIC CONCEPTS AND CENTRE OF GRAVITY	
	Middle line plane – transverse plane – waterplane – waterplane area – waterline – amidships – midship section – midship section area – beam – moulded depth. Centre of gravity – shift in centre of gravity due to addition of mass – shift in centre of gravity due to movement of mass – effect of suspended mass.	9
Unit III	STABILITY OF SHIPS	
	Stability of ships – statical stability at small angles of heel – stable, unstable and neutral equilibrium – transverse metacentre –metacentric diagram – inclining experiment – free surface effect – effect of tank divisions on free surface – stability at large angles of heel – curve of statical stability – dynamical stability.	9
Unit IV	CALCULATION OF AREA AND TRIM	
	Calculation of area under a curve – Simpson’s first rule – application of Simpson’s rule to calculation of displacement and volume of displacement –Simpson’s second rule – Trapezoidal rule – Tchebycheff’s rule. Trim – centre of flotation – mean draught – longitudinal metacentre – longitudinal metacentric height– bilging – reserve buoyancy – permeability.	9
Unit V	PROPELLERS AND RUDDERS	
	Propellers – diameter – pitch – pitch ratio – theoretical speed - apparent slip – real slip – wake – projected area – developed area – blade area ratio – disc area ratio – thrust – measurement of pitch – cavitation – built and solid propellers. Rudder – function of rudder – parts of rudder – types of rudder.	9
TOTAL HOURS		45

Suggested list of students’ activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Archimedes’ principle may be demonstrated through experiment.
- Preparation of different types of ship models may be given as mini project to students.
- Practice may be given in dismantling and assembling of ship machineries.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Naval Architecture for Marine Engineers By E.A.Stokoe
- Naval Architecture and ship construction By Vikram Gokhle and N.Nanda.
- Basic Ship Theory, Vol - I and Vol – II By Rawson and Tupper.
- Naval Architecture By Taylor.
- Naval Architecture by Brian Baxter.

Web-based/online resources:

- <https://www.marineinsight.com/naval-architecture/what-is-naval-architecture/>
- <https://www.sciencedirect.com/topics/engineering/naval-architecture>
- <https://www.sname.org/principles-naval-architecture>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

1027236112	SHIPPING PRACTICE	L	T	P	C
Theory		3	0	0	3

Introduction:

Shipping company is basically a business organization. Its function is to carry cargo and passengers from one port to another port. There are many types of ships. Specialised ships carry a particular type of cargo. Chartering of ships, their freight, marine insurance and voyage estimation are included in this subject.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about shipping industry.
- Learn the chartering of ships.
- Familiarise with freight and ship’s papers.
- Understand marine insurance.
- Have a basic information about voyage estimate.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the types of ships and different departments of ships.
- CO2: Know the chartering of ships.
- CO3: Understand freight and ship’s papers.
- CO4: Summarise the principles of marine insurance.
- CO5: Have an idea about voyage estimates.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	3	3	2
CO2	3	3	3	3	2	3	1
CO3	2	3	3	3	3	2	1
CO4	3	3	2	2	2	3	2
CO5	3	3	3	3	2	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus contents

1027236112	SHIPPING PRACTICE	L	T	P	C
Theory		3	0	0	3
Unit I	Shipping company				
The shipping company - organization of shipping company - various departments in the company - Liner ship - Tramp ship - Group Organization - Different services – Passenger services - cargo services - specialized service - shipping card - closing date and time –Mate receipt - cargo plan.					9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

Unit II	Ship owner and charter	
	The ship owner – the ship owner and merchant – duties of ship owner – ship owner’s liability – role of merchant shipper – forwarding in the group’s shipper. Bill of Lading – Various Types – importance – Liabilities – signing – Liner way bill Chartering – charter parties – chartering vessels – various types of chartering – voyage – time – demise – bareboat.	9
Unit III	Freight	
	Freight – Calculation of freight – Various types of freights – actual – Lump sum – dead – back – advance – stoppage in transitive. Ship papers and procedure of ship’s entering and leaving port – Declaration of Health- Deratisation certification – official log customs procedure.	9
Unit IV	Marine insurance	
	Definition and Principles of marine Insurance – Insurable Interest – Utmost good Faith – Proximate cause – Indemnity - subrogation. Marine Losses – Total Loss - Constructive Total Loss – Partial Loss – General Average Loss – Protection and Indemnity Clubs.	9
Unit V	Voyage estimation	
	Voyage estimate – Preparation – Importance – Bulk Carriers Estimate. Preparation of estimates for Tankers. Points to be observed during estimate – Cargo calculation Containerization – advantage – disadvantages – documents for containerization.	9
TOTAL HOURS		45

Suggested list of students’ activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Prepare chart indicating different departments of ships.
- Form groups as ship-owner and charterer and prepare charter party.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Prepare charts of freights for different cargo.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Branch's Elements of Shipping by Alan Edward Branch, Michael Robarts.
- Shipping Practice by David Toutou, Marty Resnick.
- *Shipping Practice* by Edward F. Stevens.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



1027236113	NAVIGATION	L	T	P	C
Theory		3	0	0	3

Introduction:

Any crew member sailing in a ship need to have a basic knowledge about navigation. A seaman should know about the latitudes and longitudes. Different types of sailing should be studied. Navigational flags are used convey important information from one ship to other or from a ship to land. Seamen should know about the working of different navigational equipments.

Course objectives:

The objective of this course is to enable the student to

- Understand about the courses and distance.
- Know about the latitudes and longitudes.
- Study about different types of sailing.
- Acquire broader idea about charts and projections.
- Understand about navigational flags and navigational lights.
- Learn about the calculation of time.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Elucidate about basic navigational terms.
- CO2: Know the charts and projections.
- CO3: Understand different types of sailing.
- CO4: Summarise the calculation of time.
- CO5: Have an idea about navigational flags and navigational lights.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	2	3
CO2	3	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	3	3
CO5	3	2	2	2	3	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best one will be considered for the internal assessment of 15 Marks.

CA1 and CA2, Assessment test should be conducted for two units as below.

PART A: (5 X 10 Marks = 50 Marks).

Eight questions will be asked; students should answer Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should answer any two questions. The question may have two subdivisions only.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Question Pattern - Model Examination and End Semester Examination - Theory Exam

PART- A (5 X 20 Marks = 100 Marks)

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks.

Sample:

- I. 1.
- 2.
- 3.
- 4.
- II. 5.
- 6.
- 7.
- 8.
- III. 9.
- 10.
- 11.
- 12.
- IV. 13.
- 14.
- 15.
- 16.
- V. 17.
- 18.
- 19.
- 20.

Syllabus contents

1027236113	NAVIGATION	L	T	P	C
Theory		3	0	0	3
Unit I					
The shape of the earth – Poles – Equator - Great circles - Small circles - Parallels of latitude - D’Lat – Meridians - Prime meridian – Longitude - D’long - Position by latitude & longitude. Measurement of distance: Nautical - Geographical and Statute mile – Knot - Effect of polar compression on nautical mile - Compass Points - True and Magnetic north - Magnetic variation and changes in its annual value - compass course to true course and vice-versa.					9



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025
REGULATION 2023

Unit II		
Departure - Relationship between Departure and D'long - Parallel sailing - Rhumb Line - Mean latitude - Plane sailing - Relationship between departure, d'lat, course and distance - Middle Latitude - Principal of Mercator projection : Mercator chart, Natural Scale - Meridional parts - DMP Latitude and longitude scales and conversion of one to the other - Mercator sailing - Relationship between Course, D'long and DMP - Principle of Gnomonic projection - Gnomonic chart.		9
Unit III		
Dead reckoning position, Estimated position & Observed position - Set and drift of current – Leeway - Spherical triangle - Great circle sailing - initial course, final course, distance and vertex. Solar System - Rotation and Revolution - Equinoxes and solstices - Cause of seasons and unequal length of day and night - True and apparent motion of bodies - Solar time - Solar day - apparent sun - mean sun and dynamical mean sun.		9
Unit IV		
Greenwich time local time - zone time - standard time - Keeping time at sea - advancing and retarding of clocks with change of longitude - International date line - Earth-moon system - moon's orbital and axial rotation - phases of the moon – liberation - Lunar month - Solar eclipse and lunar eclipse - Conditions necessary for occurrence of a solar or lunar eclipse - Umbra and Penumbra.		9
Unit V		
Flags – types of flags – when and where hoisted – flags hoisted when entering or leaving a port – when shifting a ship – when berthed – saluting another ship – mourning – meaning of some important international code flags. Navigational lights - Masthead light – Side light – Stern light - Towing light - A white, red, green or yellow all round light – range of navigational lights.		9
TOTAL HOURS		45



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Identify the basic navigational concepts on a globe.
- Practice different types of projections on charts.
- Calculate the latitude and longitude in your class room.
- Draw solar eclipse and lunar eclipse on charts.
- Educational visit may be arranged by travelling in ship.

Reference:

- Munro's Navigation By Capt G.E. Earl and Capt F.L. Main.
- Principles of Navigation Paperback by Capt. T. K. Joseph, Capt. S.S.S. Rewari.
- Navigation for Masters by D.J. House.

Web-based/online resources:

- <https://www.nationalgeographic.org/encyclopedia/navigation/>
- <https://www.seably.com/courses/an-introduction-to-navigation-basics>
- <https://www.discoverboating.com/resources/marine-navigation-how-to-navigate-a-boat>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027236241	PERSONAL SURVIVAL TECHNIQUES	L	T	P	C
Practicum		1	0	4	3

Introduction:

Any person working on board a ship should be ready to face any emergency situation that may occur during sailing. Seamen should have knowledge about handling life saving appliances. In an emergency situation the ship may need to be abandoned. In such a situation passengers and crew members need to escape in survival crafts to save their lives. The officers in charge need to give survival instructions to the passengers and other crew members.

Course objectives:

The objective of this course is to enable the student to

- Understand the emergency situations that can occur in ships.
- Know evacuation procedure in case of emergencies.
- Study about the survival techniques.
- Acquire broader ideas about survival instructions.
- Understand about search and rescue problems.
- Study about ration to be provided for the persons.

Course outcomes:

On successful completion of this course, the student will be able to

CO1: Learn about the emergency situations that can occur in ships.

CO2: Know the evacuation procedure in case of emergencies.

CO3: Understand the applications of survival crafts.

CO4: Summarise the search and rescue operations.

CO5: Have an idea about the communication methods onboard ship.

Pre-requisites:

Knowledge of basic science.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	3	3	3	2
CO2	3	3	2	2	3	3	3
CO3	3	3	3	3	3	3	2
CO4	1	2	1	2	3	3	2
CO5	3	3	3	2	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Formula / Tabular column	20
C	Execution / Procedure	25
D	Output / Result	10



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus contents

1027236241	PERSONAL SURVIVAL		L	T	P	C
Practicum	TECHNIQUES		1	0	4	3
Unit I	Safety, survival and emergency situations					
Theory Safety guide lines – principles of survival at sea – types of emergencies – precautions – muster list and emergency signals – crew and emergency instructions – extra equipment for survival – abandoning ship.						3
Unit II	Evacuation					
Theory Abandoning ship as a last resort – Emergency signal – Abandon ship signal – personal preparation for abandoning ship – crew duties – launching survival craft – master’s orders to abandon ship – means of survival.						3
Unit III	Survival crafts, rescue boats and life saving appliances					
Theory Lifeboats – types of lifeboats – liferafts – types of liferafts – line throwing appliances –						3



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

general alarm and public address system – lifebuoys – lifejackets – immersion suits – thermal protective aid.		
Unit IV	Helicopter assistance and emergency radio equipment	
Theory Communication with helicopter – evacuation from ship and survival craft – helicopter pickup – rescue net – litter – emergency position indicating radio beacons (EPIRB) – search and rescue radar transponder (SART) – walkie-talkie.		3
Unit V	Communication onboard	
Theory Fundamentals of communication – types of communication – communication onboard ships – written communication – verbal communication – hand signals – effective transmission and listening skills – methods to improve communications.		3
PRACTICAL		
1. Practice Huddle position. 2. Practice Helpline position. 3. Practice life raft drill. 4. Practice emergency fire drill. 5. Donning of life jacket and lifebuoy. 6. Donning of immersion suit and thermal protective aid. 7. Practice search and rescue drill. 8. Practice launching of life raft. 9. Practice boarding procedure of life raft. 10. Practice boarding procedure of life boat.		60
TOTAL HOURS		75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of different types of ship models may be given as mini project to students.
- Practice may be given in dismantling and assembling of ship machineries.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Fire drill may be practiced.
- Educational visit may be arranged by travelling in ship.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Survival at sea. The life boat and life raft, C.H. Wright, Brownson & Furguson Ltd.
- *Seamanship Primer* by Capt. J.Dinger, Bhandarkar Publishing.
- Ship board operation, H.I. Lavery, British library cataloguing in publications.
- Survival in Life boat and life raft By Capt. S.K. Puri.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



1027236242	FISHING TECHNOLOGY	L	T	P	C
Practicum		1	0	4	3

Introduction:

The crafts and vessels used for fishing should be equipped with the latest safety devices. The safety of crew members and the cargo is very important. Latest technology is being used in developing fishing gears and machineries. Preservation of fish on board the vessels should be taken care.

Course objectives:

The objective of this course is to enable the student to

- Acquire knowledge about indigenous fishing crafts.
- Learn the functioning of modern fishing vessels.
- Familiarise with the indigenous fishing gears.
- Understand the modern fishing gears.
- Have a basic information about fishing gear accessories.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about the indigenous fishing crafts.
- CO2: Know the functioning of modern fishing vessels.
- CO3: Understand the indigenous fishing gears.
- CO4: Summarise the modern fishing gears.
- CO5: Have an idea about the fishing gear accessories.

Pre-requisites:

Knowledge of basic science.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	3	2	3
CO2	3	3	3	2	3	2	3
CO3	3	3	3	2	3	2	3
CO4	3	3	3	2	3	2	3
CO5	3	3	3	2	3	2	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Drawing	15



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

C	Procedure / Execution	20
D	Output / Result	10
TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Drawing	20
C	Execution / Procedure	25
D	Output / Result	10



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

E	Written Test *	30
F	Viva Voce	10
TOTAL		100

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus content

1027236242		FISHING TECHNOLOGY	L	T	P	C
Practicum			1	0	4	3
Unit I	Indigenous Fishing Crafts					
Theory						3
General classification of fishing crafts – Important indigenous fishing crafts – Dugout canoe – Masula boat – Kakinada Nava – Shoe Dhony – Rampani boat – Sathpati boat – Machwa – Wahan – Maliya boat – Out rigger boat – Rathnagiri.						
Unit II	Modern Fishing Vessels					
Theory						3
Deck layout – Stern trawlers – Out rigger trawlers – Deck layout – Purse seiner – Long liner – Deck layout and deck equipments – Care and maintenance of fishing vessels – Boat construction materials.						
Unit III	Indigenous Fishing Gears					
Theory						3
Classification of fishing gears –Cast net – Gill net – Chinese Dip net – Boat seines – Shore						



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

seines – Hook and line – Set net – Dol net – Description of structure and basic principles of operation.		
Unit IV	Modern Fishing Gears	
Theory Trawl net and Purse seine net – Parts – Classification – Wing – Head rope – Foot rope – Floats – Sinkers - Long line for tuna – Parts of long line – Main line – Branch line proper Sekiyama – Snood wire – Hooks – Troll line – Squid jigging.		3
Unit V	Fishing Gear Accessories	
Theory Floats – Sinkers – Otter board – Bobbins – Tickler chains – Warp – Thimble – Shackles and swivels – Purse rings – Cord end rings – Winch – Line hauler – Power block – Light buoy – Hooks – Single Hook – Double Hook – Barbed hook – Barbless hook.		3
PRACTICAL		
<ol style="list-style-type: none"> 1. Glossary of terms related to the various parts and positions of fishing boat. 2. Drawing practice of deck layout of Stern trawl, out rigger trawler, purse seiner, long liner, troll liner. 3. Fabrication of net – 10x10 meshes, 20x20 meshes – Shaping of net – baiting – Creasing – Tailoring. 4. Definition of Mesh and types of meshes – Rhombic mesh – Square mesh – Hexagonal mesh. 5. Rope work – Splicing – eye splicing – Short, long and back splicing and specification of construction of wire rope. 6. Identification of Gear materials, cotton, polyethylene, polypropylene, polyester. Floats – High density floats – Low density floats – Glass floats – Thermocole floats. 7. Drawing practice and design of fishing gears – Trawl net – purse seine net – Long line – Pole and line – Troll line – Gill nets – Thuri valai – Cast net. 8. Field visit to net making plant. 9. Visit to fishing harbour to study the deck layout of mechanised fishing vessels – Trawler – Long liner – Gill netter – Purse seiner and infrastructural facilities for operation and maintenance of fishing vessels. 		60



10. Field visit to boat building yard.	
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Preparation of fishing craft models may be given as mini project to students.
- Practice may be given in the use of fishing gears.
- Educational visit may be arranged by travelling in fishing trawlers.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Modern Fishing Gear of the World by Hilmer Kristaonsson
- Fishing Craft of the World by FAO Publications
- Marine Products of Commerce by Donald K. Tressler and James Mc W. Lemon
- CIFNET Manual
- Fish catching methods of the world – Salsbury

Web-based/online resources:

- <https://www.fao.org/fishery/en/technology>
- <https://www.cift.res.in/>
- <https://fishtech.is/>



1027236243	MARINE WELDING TECHNOLOGY	L	T	P	C
Practicum		1	0	4	3

Introduction:

Diploma holders in marine engineering should have enough knowledge about different welding processes and different types of welding equipments. Special welding processes are used in ships where conventional methods cannot be used. Knowledge about welding of different metals is necessary. The welder should judge the applicability of the weld.

Course objectives:

The objective of this course is to enable the student to

- Understand about different types of welding processes and equipments.
- Know about the special welding process.
- Study about metallurgy of welding.
- Acquire broader idea about gas welding techniques.
- Understand about advanced welding processes.

Course outcomes:

On successful completion of this course, the student will be able to

- CO1: Learn about different types of welding processes and equipments.
- CO2: Know the special welding process.
- CO3: Understand advanced welding processes.
- CO4: Summarise the gas welding techniques.
- CO5: Have an idea about metallurgy of welding.

Pre-requisites:

Knowledge of basic science.



CO/PO mapping:

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	1	3	2	3	3
CO2	3	3	1	3	2	3	3
CO3	3	3	1	3	2	3	3
CO4	3	3	1	3	2	3	3
CO5	3	3	1	3	2	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional strategy:

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations and real world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome-based and employability-based.
- All demonstrations/Hand-on practices are under a simulated environment (may be followed by a real environment as far as possible).

Assessment Methodology:

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

Portion	Cycle I Exercises 50% Exercises	Cycle II Exercises	All Units	All Exercises	All Exercises
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Internal Marks	40				
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best one will be considered for the internal assessment of 10 Marks.

Practical documents should be maintained for every exercise / experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Aim & tools required	5
B	Diagram	15
C	Procedure / Execution	20
D	Output / Result	10



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

TOTAL		50
E	Practical Documents (As per the portions)	10
		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

Question pattern – Written Test Theory

Description		Marks	
Part – A	10 Questions to be answered out of 15 questions. (Three questions from each unit.)	10 X 5 Marks	50 Marks
Part – B	5 Questions to be answered out of 8 questions. (One or two questions from each unit.)	5 X 10 Marks	50 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	DESCRIPTION	MARKS
A	Aim & Apparatus Required	5
B	Diagram	20
C	Execution / Procedure	25
D	Output / Result	10
E	Written Test *	30
F	Viva Voce	10
TOTAL		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

***Written Test:**

Part A - 15 X 1 Mark = 15 Marks. Fifteen MCQ (one mark each) shall be asked from the complete theory portions (three questions from each unit). Students need to answer all the questions.

Part B - 5 X 3 Marks = 15 Marks. Eight questions each of three marks shall be asked from the complete theory portions (one or two questions from each unit). Students can answer any five questions.

Each batch should have a separate set of questions.

Syllabus content

1027236243		MARINE WELDING			
Practicum		TECHNOLOGY			
		L	T	P	C
		1	0	4	3
Unit I	Welding processes and equipment				
Arc welding –Types of electrodes - Arc welding power sources – DC Power Sources – DC generators – rectifiers – AC power sources – Generators and transformers – arc temperature and heat distribution.					3
Unit II	Special welding processes				
Submerged arc welding –TIG welding –MIG welding – resistance welding – spot welding – CO2 welding – Electro slag welding					3
Unit III	Advanced welding process				
Plasma arc welding – Under water welding – Ultrasonic welding – explosive welding – atomic hydrogen welding – electron beam welding – laser beam welding					3
Unit IV	Gas welding and other techniques				
Gas welding –oxy-acetylene welding – gas welding techniques – gas welding equipment – gas cutting – Brazing – Soldering					3
Unit V	Metallurgy of welding				
Metallurgical effects of welding–weld metal solidification – absorption of gases by welds and their effects- gas metal reactions – porosity in welds – Isothermal contours for localised heating – thermal effects of welding on parent metal.					3
PRACTICAL					



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Ex No: 01. T – joint practice using metal arc welding.	60
Ex No: 02. Butt joint practice using metal arc welding.	
Ex No: 03. T – joint practice using gas welding.	
Ex No: 04. Butt joint practice using gas welding.	
Ex No: 05. Lap joint practice using flux cored arc welding.	
Ex No: 06. Corner joint practice using flux cored arc welding.	
Ex No: 07. T- joint using gas tungsten arc welding.	
Ex No: 08. Butt joint using gas tungsten arc welding.	
Ex No: 09. Lap joint practice using gas welding.	
Ex No: 10. Open corner joint practice using gas welding.	
TOTAL HOURS	75

Suggested list of students' activity:

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Arc welding project may be given as mini project to students.
- Practice may be given in special welding processes.
- A chart may be prepared with precautions to be taken during welding.
- Welding defects may be identified.
- Industrial visits may be arranged to ports and shipyards.

Reference:

- Workshop technology I and II by Hajra Choudary
- Introduction to Marine Engineering by D.A.Taylor.
- *Seamanship Primer* by Capt. J.Dinger, Bhandarkar Publishing.
- Reeds Vol 5: Ship Construction for Marine Engineers by Paul Anthony Russell, E.A.Stokoe.
- Marine Engineering by Roy L.Harrington.

Web-based/online resources:

- <https://www.marineinsight.com>
- <https://www.imo.org>
- <https://www.ship-technology.com>



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

1027236351	INTERNSHIP	540 Periods	C
Project			12

Introduction

Internships in educational institutions are designed to provide students with practical experience in their field of study and to bridge the gap between academic knowledge and professional practice.

Objectives

After completing Internship, Interns will be able to,

- Apply the theoretical knowledge and skill during performance of the tasks assigned in internship.
- Demonstrate soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship.
- Document the Use case on the assigned Task.
- Enable interns to apply theoretical knowledge gained in the classroom to real-world practical applications.
- Provide hands-on experience in the industrial practices.
- Develop essential skills such as communication, organization, teamwork, and problem-solving.
- Enhance specific skills related to the intern's area of focus.
- Offer a realistic understanding of the daily operations and responsibilities.
- Provide opportunities to work under the guidance of experienced supervisors and administrators.
- Allow interns to explore different career paths.
- Help interns make informed decisions about their future career goals based on first hand experience.
- Facilitate the establishment of professional relationships with supervisor, administrators, and other professionals in the field.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Provide access to a network of contacts that can be beneficial for future job opportunities and professional growth.
- Foster personal growth by challenging interns to step out of their comfort zones and take on new responsibilities.
- Build confidence and self-efficacy through successful completion of internship tasks and projects.
- Give insight into the policies, regulations, and administrative practices.
- Allow interns to observe and understand the implementation of standards and policies in practice.
- Provide opportunities for constructive feedback from supervisors and mentors, aiding in the intern's professional development.
- Enable self-assessment and reflection on strengths, areas for improvement, and career aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promoting inclusive and equitable industrial practices.

Course Outcomes

CO 1: Demonstrate improved skills.

CO 2: Exhibit increased professional behavior.

CO 3: Apply theoretical knowledge and principles in real-world practices.

CO 4: Develop and utilize assessment tools to evaluate the learning and practices.

CO 5: Engage in reflective practice to continually improve their learning and professional growth.

Facilitating the Interns by an Internship Provider.

Orient intern in the new workplace. Give interns an overview of the organization, Explain the intern's duties and introduce him or her to co-workers.

Develop an internship job description with clear deliverables and timeline.

Allow the interns in meetings and provide information, resources, and opportunities for professional development.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

The interns have never done this kind of work before, they want to know that their work is measuring up to organizational expectations, hence provide professional guidance and mentoring to the intern. Daily progress report of Intern is to be evaluated by industry supervisor. examine what the intern has produced and make suggestions. Weekly supervision meetings can help to monitor the intern's work.

Duties Responsibilities of the Faculty Mentor

To facilitate the placement of students for the internship

To liaison between the college and the internship provider

To assist the Industrial Training Supervisor during assessment

Instructions to the Interns

- Students shall report to the internship provider on the 1st day as per the internship schedule.
- Intern is expected to learn about the organization, its structure, product range, market performance, working philosophy etc.
- The interns shall work on live projects assigned by the internship provider.
- The Intern shall record all the activities in the daily log book and get the signature of the concerned training supervisor.
- Intern shall have 100% attendance during internship programme. In case of unavoidable circumstances students may avail leave with prior permission from the concerned training supervisor of the respective internship provider. However, the maximum leave permitted during internship shall be as per company norms where they are working and intern shall report the leave sanctioned details to their college faculty mentor.
- The interns shall abide all the Rules and Regulations of internship provider
- Intern shall follow all the safety Regulations of internship provider.
- On completion of the internship, the intern shall report to the college and submit the internship certificate mentioning duration of internship, evaluation of interns by internship provider, Student's Diary and Comprehensive Training Report.

Attendance Certification

Every month students have to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Training Reports

The students have to prepare two types of reports: Weekly reports in the form of a diary to be submitted to the concerned staff in-charge of the institution. This will be reviewed while awarding Internal

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training.

Any data, drawings etc. should be incorporated with the consent of the Organisation.

Scheme of Evaluation

Internal Assessment

Students should be assessed for 50 Marks by industry supervisor and polytechnic faculty mentor during 8th Week and 15th Week. The total marks (50 + 50) scored shall be converted to 40 marks for the Internal Assessment.

Sl. No.	Description	Marks
A	Punctuality and regularity. (Attendance)	10



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Ability to solve practical problems. Sense of responsibility	10
D	Self expression / communication skills. Interpersonal skills / Human Relation.	10
E	Report and Presentation.	10
Total		50

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of internship period (Dec - May). The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

1027236353	FELLOWSHIP	540 Periods	C
Project			12

Introduction

The Fellowship in the Diploma in Engineering program is designed to provide aspiring engineers with a comprehensive educational experience that combines theoretical knowledge with practical skills. This fellowship aims to cultivate a new generation of proficient and innovative engineers who are equipped to meet the challenges of a rapidly evolving technological landscape.

Participants in this fellowship will benefit from a robust curriculum that covers core engineering principles, advanced technical training, and hands-on projects. The program emphasizes interdisciplinary learning, encouraging fellows to explore various branches of engineering, from mechanical and civil to electrical, electronics & communication and computer engineering. This approach ensures that graduates possess a versatile skill set, ready to adapt to diverse career opportunities in the engineering sector.

In addition to academics, the fellowship offers numerous opportunities for professional development. Fellows will engage with industry experts through seminars, workshops, and internships, gaining valuable insights into real-world applications of their studies. Collaborative projects and research initiatives foster a culture of innovation, critical thinking, and problem-solving, essential attributes for any successful engineer.

By offering this fellowship, participants become part of a vibrant community of learners and professionals dedicated to advancing the field of engineering. The program is committed to supporting the growth and development of each fellow, providing them with the tools and resources needed to excel both academically and professionally.

The Fellowship in the Diploma in Engineering is more than just an educational endeavor; it is a transformative journey that equips aspiring engineers with the knowledge, skills, and experiences necessary to make significant contributions to society and the engineering profession.

Objectives

After completing students will be able to,

- Provide fellows with a solid foundation in core engineering principles and advanced technical knowledge across various engineering disciplines.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Equip fellows with hands-on experience through laboratory work, projects, and internships, ensuring they can apply theoretical knowledge to real-world scenarios.
- Promote interdisciplinary understanding by encouraging exploration and integration of different engineering fields, fostering versatility and adaptability in fellows.
- Encourage innovation and creativity through research projects and collaborative initiatives, enabling fellows to develop new solutions to engineering challenges.
- Facilitate professional growth through workshops, seminars, and interactions with industry experts, preparing fellows for successful careers in engineering.
- Develop critical thinking and problem-solving skills, essential for tackling complex engineering problems and making informed decisions.
- Strengthen connections between academia and industry by providing opportunities for internships, industry visits, and guest lectures from professionals.
- Foster leadership qualities and teamwork skills through group projects and collaborative activities, preparing fellows for leadership roles in their future careers.
- Instill a sense of ethical responsibility and awareness of the social impact of engineering practices, encouraging fellows to contribute positively to society.
- Promote a culture of lifelong learning, encouraging fellows to continually update their knowledge and skills in response to technological advancements and industry trends.
- Prepare fellows to work in a global engineering environment by exposing them to international best practices, standards, and cross-cultural experiences.

Course Outcomes

CO 1: Demonstrate a strong understanding of core engineering principles and possess the technical skills necessary to design, analyze, and implement engineering solutions across various disciplines.

CO 2: Apply theoretical knowledge to practical scenarios, effectively solving engineering problems through hands-on projects, laboratory work, and internships.

CO 3: Exhibit the ability to conduct research, develop innovative solutions, and contribute to advancements in engineering through critical thinking and creative approaches to complex challenges.

CO 4: Understand and adhere to professional and ethical standards in engineering practice, demonstrating responsibility, integrity, and a commitment to sustainable and socially responsible engineering.

CO 5: Enhance strong communication skills, both written and verbal, and be capable of working effectively in teams, demonstrating leadership and collaborative abilities in diverse and multidisciplinary environments.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Important points to consider to select the fellowship project.

Selecting the right fellowship project is crucial for maximizing the educational and professional benefits of a Diploma in Engineering program.

- **Relevance to Future Plans:** Choose a project that aligns with your long-term career aspirations and interests. This alignment will ensure that the skills and knowledge you gain will be directly applicable to your desired career path.
- **Industry Relevance:** Consider the current and future relevance of the project within the industry. Opt for projects that address contemporary challenges or emerging trends in engineering.
- **Access to Facilities:** Ensure that the necessary facilities, equipment, and materials are available to successfully complete the project. Lack of resources can hinder the progress and quality of your work.
- **Mentorship and Guidance:** Select a project that offers strong mentorship and support from experienced faculty members or industry professionals. Effective guidance is crucial for navigating complex problems and achieving project objectives.
- **Project Scope:** Assess the scope of the project to ensure it is neither too broad nor too narrow. A well-defined project scope helps in setting clear objectives and achievable milestones.
- **Feasibility:** Evaluate the feasibility of completing the project within the given timeframe and with the available resources. Consider potential challenges and ensure you have a realistic plan to address them.
- **Technical Skills:** Choose a project that allows you to develop and enhance important technical skills relevant to your field of study. Practical experience in using specific tools, technologies, or methodologies can be highly beneficial.
- **Soft Skills:** Consider projects that also offer opportunities to develop soft skills such as teamwork, communication, problem-solving, and project management.
- **Innovative Thinking:** Select a project that encourages creativity and innovative problem-solving. Projects that push the boundaries of traditional engineering approaches can be particularly rewarding.
- **Societal Impact:** Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

Guidelines to select Fellowship

- Ensure the program is accredited by a recognized accrediting body and has a strong reputation for quality education in engineering.
- Ensure it covers core engineering principles that align with your interests and career goals.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Investigate the qualifications and experience of the faculty mentor. Look for programs with faculty who have strong academic backgrounds, industry experience, and active involvement in research.
- Check if the program provides adequate hands-on training opportunities, such as laboratory work, workshops, and access to modern engineering facilities and equipment.
- Assess the program's connections with industry. Strong partnerships with companies can lead to valuable internship opportunities, industry projects, and exposure to real-world engineering challenges.
- Explore the availability of research opportunities. Participation in research projects can enhance your learning experience and open doors to innovative career paths.
- Look for programs that offer professional development resources, such as workshops, seminars, and networking events with industry professionals and alumni.
- Ensure the program provides robust support services, including academic advising, career counseling, mentorship programs, and assistance with job placement after graduation.
- Consider the cost of the program and available financial aid options, such as scholarships, grants, and fellowships. Evaluate the return on investment in terms of career prospects and potential earnings.
- Research the success of the program's alumni. High employment rates and successful careers of past graduates can indicate the program's effectiveness in preparing students for the engineering field.

Duties Responsibilities of the Faculty Mentor

Each student should have a faculty mentor for the Institute.

- Get the approval from the Chairman Board of Examinations with the recommendations of the HOD/Principal for the topics.
- Provide comprehensive academic advising to help fellows select appropriate specializations, and research projects that align with their interests and career goals.
- Guide fellows through their research projects, offering expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist fellows in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Offer career advice and support, helping fellows explore potential career paths, prepare for job searches, and connect with industry professionals and opportunities.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Facilitate connections between fellows and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure fellows have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of fellows, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging fellows to practice integrity and responsibility in their work.
- Assist with administrative tasks related to the fellowship program, such as preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development of fellows.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the Fellowship Scholar

- Regularly meet with your faculty mentor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your mentor.
- Develop strong organizational skills. Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in research projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student to offer fellowship.

- **Completed Application Form:** This is typically the standard form provided by the institution or fellowship program that includes personal information, educational background, and other relevant details.
- **Detailed CV/Resume:** A comprehensive document outlining your educational background, knowledge experience, interest in research experience, publications, presentations, awards, and other relevant achievements if any.
- **Personal Statement:** A document explaining your motivation for applying to the fellowship, your career goals, how the fellowship aligns with those goals, and what you intend to achieve through the program.
- **Recommendation Letters:** Letters from faculty mentor, employer, or professionals who can attest to your academic abilities, professional skills, and suitability for the fellowship.
- **Proposal/Description:** A detailed proposal or description of the fellowship project or study you plan to undertake during the fellowship. This should include objectives, methodology, expected outcomes, and significance of the project.
- **Enrollment Verification:** Documentation verifying your current acceptance status in the academic institution or industry where the fellowship will be conducted.
- **Funding Information:** Details about any other sources of funding or financial aid you are receiving, if applicable. Some fellowships may also require a budget proposal for the intended use of the fellowship funds.
- **Samples of Work:** Copies of the relevant work that demonstrates your capabilities and accomplishments in your field.
- **Endorsement Letter:** A letter from your current academic institution endorsing your application for the fellowship, if required.
- **Ethical Approval Documents:** If your research involves human subjects or animals, you may need to submit proof of ethical approval from the relevant ethics committee.
- **Additional Documents:** Any other documents requested by the fellowship program required by the institution.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

Attendance Certification

Every month students have to get their attendance certified by the supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the faculty mentor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Rubrics for Fellowship. Review I & II.

Sl. No.	Topics	Description
1	Alignment with Objectives	Assess how well the project aligns with the stated objectives and requirements. Determine if the student has addressed the key aspects outlined in the project guidelines.
2	Depth of Research:	Evaluate the depth and thoroughness of the literature review. Assess the student's ability to identify and address gaps in existing research.
3	Clarity of Objectives:	Check if the student has clearly defined and articulated the objectives of the project. Ensure that the objectives are specific, measurable, achievable, relevant, and time-bound (SMART).
4	Methodology and Data Collection:	Evaluate the appropriateness and justification of the research methodology. Assess the methods used for data collection and their relevance to the research questions.
5	Analysis and Interpretation:	Examine the quality of data analysis techniques used. Assess the student's ability to interpret results and draw meaningful conclusions.
6	Project Management:	Evaluate the project management aspects, including adherence to timelines and milestones. Assess the student's ability to plan and execute the project effectively.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

7	Documentation and Reporting:	Check the quality of documentation, including code, experimental details, and any other relevant materials. Evaluate the clarity, structure, and coherence of the final report.
8	Originality and Creativity:	Assess the level of originality and creativity demonstrated in the project. Determine if the student has brought a unique perspective or solution to the research problem.
9	Critical Thinking:	Evaluate the student's critical thinking skills in analyzing information and forming conclusions. Assess the ability to evaluate alternative solutions and make informed decisions.
10	Problem-Solving Skills:	Evaluate the student's ability to identify and solve problems encountered during the project. Assess adaptability and resilience in the face of challenges.

INTERNAL MARKS - 40 Marks

As per the rubrics each topic should be considered for the Review I and Review II. Equal weightage should be given for all the topics. It should be assessed by a faculty mentor and the industrial professional or research guide.

Review 1 shall be conducted after 8th week and Review 2 shall be conducted after 14th week in the semester. Average marks scored in the reviews shall be considered for the internal assessment of 30 Marks.

Scheme of Evaluation

PART	DESCRIPTION	MARKS
A	Assessment as per the rubrics.	30
B	Attendance	10
Total		40



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025

REGULATION 2023

END SEMESTER EXAMINATION - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of fellowship. The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report of the Fellowship Work.	30
C	Presentation by the student.	30
D	Viva Voce	20
Total		100



1027236374	IN-HOUSE PROJECT	540 Periods	C
Project			12

Introduction

Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two for the partial fulfillment for the award of Diploma in Engineering.

For the project works, the Department will constitute a three-member faculty committee to monitor the progress of the project and conduct reviews regularly.

If the projects are done in-house, the students must obtain the bonafide certificate for project work from the Project supervisor and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the Project Viva Voce examination.

For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one internal faculty advisor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.

The final examination for project work will be evaluated based on the final report submitted by the project group **of not exceeding four students**, and the viva voce by an external examiner.

Objectives

Academic project work plays a crucial role in the education of Diploma in Engineering students, as it helps them apply theoretical knowledge to practical situations and prepares them for real-world engineering challenges.

- **Integration of Knowledge:** Consolidate and integrate theoretical knowledge acquired in coursework to solve practical engineering problems.
- **Skill Development:** Enhance technical skills related to the specific field of engineering through hands-on experience and application.
- **Problem-Solving Abilities:** Develop critical thinking and problem-solving abilities by addressing complex engineering issues within a defined scope.
- **Project Management:** Gain experience in project planning, execution, and management, including setting objectives, timelines, and resource allocation.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- **Teamwork and Collaboration:** Foster teamwork and collaboration by working in multidisciplinary teams to achieve project goals and objectives.
- **Research Skills:** Acquire research skills by conducting literature reviews, gathering relevant data, and applying research methodologies to investigate engineering problems.
- **Innovation and Creativity:** Encourage innovation and creativity in proposing and developing engineering solutions that may be novel or improve upon existing methods.
- **Communication Skills:** Improve communication skills, both oral and written, by presenting project findings, writing technical reports, and effectively conveying ideas to stakeholders.
- **Ethical Considerations:** Consider ethical implications related to engineering practices, including safety, environmental impact, and societal concerns.
- **Professional Development:** Prepare for future professional roles by demonstrating professionalism, initiative, and responsibility throughout the project lifecycle.

Course Outcomes

CO 1: Demonstrate the ability to apply theoretical concepts and principles learned in coursework to solve practical engineering problems encountered during the project.

CO 2: Develop and enhance technical skills specific to the field of engineering relevant to the project, such as design, analysis, simulation, construction, testing, and implementation.

CO 3: Apply critical thinking and problem-solving skills to identify, analyze, and propose solutions to engineering challenges encountered throughout the project lifecycle.

CO 4: Acquire project management skills by effectively planning, organizing, and executing project tasks within defined timelines and resource constraints.

CO 5: Improve communication skills through the preparation and delivery of project reports, presentations, and documentation that effectively convey technical information to stakeholders.

Important points to consider to select the In-house project.

- Selecting a project work in Diploma Engineering is a significant decision that can greatly influence your learning experience and future career prospects.
- Choose a project that aligns with your career aspirations and interests within the field of engineering. Consider how the project can contribute to your professional development and future opportunities.
- Ensure the project aligns with your coursework and specialization within the Diploma program. It should complement and build upon the knowledge and skills you have acquired in your studies.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Evaluate the scope of the project to ensure it is manageable within the given timeframe, resources, and constraints. Avoid projects that are overly ambitious or impractical to complete effectively.
- Assess the availability of resources needed to conduct the project, such as equipment, materials, laboratory facilities, and access to relevant software or tools. Lack of resources can hinder project progress.
- Select a project that genuinely interests and motivates you. A project that captures your curiosity and passion will keep you engaged and committed throughout the project duration.
- Consider the availability and expertise of faculty advisors or industry mentors who can provide guidance and support throughout the project. Effective mentorship is crucial for success.
- Clearly define the learning objectives and expected outcomes of the project. Ensure that the project will help you achieve specific learning goals related to technical skills, problem-solving, and professional development.
- Look for opportunities to propose innovative solutions or explore new methodologies within your project. Projects that encourage creativity can set you apart and enhance your learning experience.
- Consider ethical implications related to the project, such as safety protocols, environmental impact, and compliance with ethical guidelines in research and engineering practices.
- Evaluate whether the project offers opportunities for collaboration with peers, experts from other disciplines, or industry partners. Interdisciplinary projects can broaden your perspective and enhance your teamwork skills.
- Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

By carefully considering these points, Diploma Engineering students can make informed decisions when selecting project work that not only enhances their academic learning but also prepares them for successful careers in engineering.

Duties Responsibilities of the internal faculty advisor.

Each group should have an internal faculty advisor assigned by the HOD/Principal.

- The in-house project should be approved by the project monitoring committee constituted by the Chairman Board of Examinations.
- The in-house project should be selected in the fifth semester itself. Each in-house project shall have a maximum of four students in the project group.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Provide comprehensive academic advising to help in the selection of appropriate in-house project that align with their interests and career goals.
- Offer expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between students and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure students have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of the in-house project, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging students to practice integrity and responsibility in their work.
- Assist in preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development .
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the students.

- Regularly meet with your internal faculty advisor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your faculty advisor.
- Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in in-house projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student for an in-house project.

Submit a printed report of your in-house project work along with the fabrication model / analysis report for the End Semester Examination.

Rubrics for In-House Project Work

Sl. No.	Topics	Description
1	Objectives	Clearly defined and specific objectives outlined. Objectives align with the project's scope and purpose.
2	Literature Review	Thorough review of relevant literature. Identification of gaps and justification for the project's contribution.
3	Research Design and Methodology	Clear explanation of the research design. Appropriateness and justification of chosen research methods.
4	Project Management	Adherence to project timeline and milestones. Effective organization and planning evident in the project execution.
5	Documentation	Comprehensive documentation of project details. Clarity and completeness in recording methods, results, and challenges.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

6	Presentation Skills	Clear and articulate communication of project findings. Effective use of visuals, if applicable.
7	Analysis and Interpretation	In-depth analysis of data. Clear interpretation of results in the context of research questions.
8	Problem-Solving	Demonstrated ability to identify and address challenges encountered during the project. Innovative solutions considered where applicable.
9	Professionalism and Compliance	Adherence to ethical standards in research. Compliance with project guidelines and requirements.
10	Quality of Work	Overall quality and contribution of the project to the field. Demonstrated effort to produce high-quality work.

SCHEME OF EVALUATION

The mark allocation for Internal and End Semester Viva Voce are as below.

Internal Marks (40 Marks)*		
Review 1 (10 Marks)	Review 2 (15 Marks)	Review 3 (15 marks)
Committee: 5 Marks. Supervisor: 5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks

Note: * The rubrics should be followed for the evaluation of the internal marks during reviews.

END SEMESTER EXAMINATION - Project Exam

The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the project supervisor and an internal examiner.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI – 600 025

REGULATION 2023

End Semester (100)#			
Record (20 Marks)	Presentation (20 Marks)	Viva Voce (20 Marks)	Model / Analysis Report (40 Marks)
External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 20 Internal: 10 Supervisor: 10

The marks scored will be converted to 60 Marks.



DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI - 600 025
REGULATION 2023