GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2023 (COGC-2023)
Semester-IV

Course Name: Seamanship and Life Saving Appliances
(Course Code: 4341803)

Diploma programmer in which this course is offered	Semester in which offered
Marine Engineering	4th Semester

1. RATIONALE

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 use 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 is used in ship.

2. COMPETENCY

At the end of the study of IV Semester the student will be able 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.

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

CO-1	Knowledge about various types of Ropes and Construction.
CO-2	Understanding about Blocks, Tackles and cargo Work in marine application.
CO-3	Understanding about Ship maintenance and correlated duties.
C0-4	Explain life saving appliances during marine services.
CO-5	Apply Abandon ship and Emergency equipments during marine operation.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	0	2	4	30*	70	25	25	150

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-projectto facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends:** **L**-Lecture; **T**– Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

Following practical outcomes (PrOs) are the sub-components of the Course Outcomes (Cos). Some of the **PrOs** marked **'*'** are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Construction of different types of ropes and its uses (Bends and Hitches).	I	04
2	Study of different types of blocks and purchases and its applications.	II	04
3	Preparation of different types of knots and its uses.	III	04
4	Study about the construction and working of 1) Life boat. 2) life raft (inflatable). 3) Life raft (rigid). 4) Life buoy. 5) Life jacket.	IV	08
5	Study about the construction and working of EPIRB	V	08
Total			28

Note

i. *More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list*

The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.

6. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

Sr. No.	Unit	Unit Title	Strategies
1	I	Ropes ,types and construction	Real life examples. Demonstration of real systems. Movies/Animations. Numerical.
2	II	Blocks ,Tackles and cargo work	
3	III	Duties and ship maintenance	
4	IV	Life saving appliances	
5	V	Abandon ship and emergency equipment	

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of this course competency.

a) Work as a leader/a team member.
b) Follow safety practices.
c) Follow ethical practices
d) Maintain tools and equipment
e) Practice environment friendly methods and processes. (Environment related)

The ADOs are best developed through the laboratory/field-based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit-1 Ropes, types and Construction	1.a Types of Ropes and construction	1.1 Ropes – Vegetable fiber ropes, construction, coiling, faking, cheesing down, whipping, Opening a new coil. Characteristics, care and maintenance Steel wire rope. 1.2 Construction, special types, coiling, cutting, opening a new coil, care and maintenance. Synthetic fiber ropes – material used, construction, special characteristics and care of synthetic ropes.

Unit – II **Blocks, tackles and cargo work**	2.a Blocks 2.b Tackles 2.c Cargo Work	2.1 Blocks – Parts of block, types of blocks, overhauling blocks, Marking. Tackles, parts of tackles, types of tackles, powergained. 2.2 Cargo works – Accident prevention when working cargo, Draft marks, Load lines, Hatch covers, preparing ship for sailing, Ventilation of cargo during the voyage. Tank and Bilge soundings.
Unit-III **Duties and Ship maintenance**	3.a. Ships department 3.b Ship Maintenance.	3.1 ships department- Time, Watches and Bells. Bridge duties. Lights and signals for power driven ships under way, Ships at anchor, Ships not under command, ship ran aground. 3.2 Ship Maintenance – Chipping, scrapping, painting, paint brushes,paints, types of paints, painting defects, Maintenance of wooden decks, Caulking.
Unit – IV **Life saving appliances**	4.a Life saving appliances 4.b Pyrotechniques.	4.1 Life saving appliances - Life buoys, Life jackets, Life boat, Marking on a life boat, Parts of life boat, Davits, Types of davits, Life boat equipment and their uses – open type lifeboat - partially enclosed lifeboat – fully enclosed lifeboat - Inflatable life raft and its equipment, Rigid life raft. 4.2 Pyrotechnics – Hand flares, Rocket parachutes, Buoyant smoke signals.
Unit –V **Abandon ship and Emergency equipments**	5.a Abandon ship signals. 5.b Emergency equipment's.	5.1 Abandon ship – Emergency signal, Abandon ship signal, Life boat launching Survival at sea, Search and Rescue. 5.2 Breathing apparatus Self-contained, bellow type,emergency escape. 5.3 Thermal protective aid. 5.4 Immersion suit.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Ropes, types and Construction.	06	04	03	03	10
II	Blocks, Tackles and cargoWork.	06	03	03	04	10
III	Duties and shipmaintenance.	10	04	06	06	16
IV	Lifesaving appliances.	10	04	07	05	16
V	Abandon ship and emergency equipment's.	10	04	06	08	18
Total		**42**	**19**	**25**	**26**	**70**

Legends: *R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

Notes:

1. This specification table shall be treated as a general guideline for students and Teachers.The actual distribution of marks in the question paper may slightly vary from above Table.
2. If midsem test is part of continuous evaluation, unit numbers I, II and unit III up to 3.4 are to be considered.
3. Ask the questions from each topic as per marks weightage. Numerical questions are to be asked only if it is specified. Optional questions must be asked from the same topic.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Select at least four various types of Ropes and analysis their construction details.
b) Select at least one life saving appliances in group of 5-6 students, analysis their material and effective use ,and perform under approved by teacher. Measure various parameter.
c) during emergency create a demonstration by approved from teacher.

11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-projects are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the micro project should be about **14-16** ***(fourteen to sixteen) student engagement hours*** during the course. The students ought to submit micro-

project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:
Effective use of following:

a) Ropes
b) Blocks, Tackles and cargo Work.
c) Maintenance demo tool kit
d) Lifesaving appliances demo kit
e) During emergency situation based demonstration.

12. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Seamanship Primer	Capt J. Dinger	Bhandarkar Publications
2	Survival in Life boat and life raft	Capt. S.K. Puri	Marine Pub.
3	Survival at sea The life boat and life raft	C.H. Wright Edition 1993	Brownson & Furguson Ltd.,
4	Ship board operation	H.I. Lavery 1993	British library cataloguing pub.

13. SOFTWARE/LEARNING WEBSITES

(a) https://www.tensiontech.com/tools-guides/rope-constructions
(b) https://cultofsea.com/deck-work/types-of-knots bends-and-hitches-used-at-sea/
(c) https://en.wikipedia.org/wiki/Block_and_tackle#:~:text=A%20block%20and%20tackle%20or,one%20moves%20with%20the%20load.

14. PO-COMPETENCY-CO MAPPING

Semester IV	Seamanship and life saving appliances (Course Code: 4341803)						
	POs						
Competency & Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
	Basic & Discipline specific knowledge	Problem Analysis	Design/ development of solutions	Engineering Tools, Experimentation& Testing	Engineering practices for society, Sustainability & environment	Project Management	Life-long Learning
Competency	Prepare production drawings using the computer and relevant software and following standards codes and norms						

Course Outcomes							
CO-1) Knowledge about various types of Ropes and Construction.	**3**	**-**	**-**	**2**	**-**	**-**	**2**
CO-2) Understanding about Blocks, Tackles and cargo Work in marine Application.	**3**	**-**	**-**	**2**	**2**	**-**	**2**
CO-3) Understanding about Ship maintenance and Correlated duties.	**2**	**3**	**2**	**2**	**2**	**-**	**2**
CO-4) Explain lifesaving appliances during marine services.	**3**	**2**	**3**	**-**	**2**	**-**	**2**
CO 5) Apply Abandon ship and Emergency equipment's during Marine operation.	**2**	**3**	**3**	**2**	**2**	**-**	**3**

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

15. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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16. BOS Resource Person

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