GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
Course Curriculum
NAVAL ARCHITECTURE
(Code: 3341801)

Diploma Programme 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 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.

2. COMPETENCY

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

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	100
3	0	0	3	70	30*	00	00	

Legends: L -Lecture; **T -**Tutorial/Teacher Guided Student Activity; **P -**Practical; **C -** Credit; **ESE**-End Semester Examination; **PA** -Progressive Assessment.

* 30 marks of Theory PA include two assignments each of 5 marks. First assignment must have total 12 numerical from Unit number I,II and III. Second assignment must be of 10 numerical from Unit number IV and V and report on student activities performed. Each numerical of each assignment must have different parameters for each student, that is each student will get total 22 numerical with same problem but with varied parameters. (Values of temperature, pressure, volume, etc may be different for each student.).

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Basic geometric concepts, Area and Volume**	1.a Geometric planes. 1.b Calculation of area of various geometric planes.	1.1 Middle line plane, transverse plane, water plane , water plane area – waterline , amidships , mid ship section – mid ship section area, beam, moulded depth. 1.2 Calculation of Area under a curve - Simpson's first rule - Application of Simpson's rule to calculation of Volume - Use of intermediate ordinates - Simpson's second rule - Trapezoidal rule .
Unit – II **Hydrostatics and Centre of gravity**	2.a Basics of hydrostatic fluids & Laws. 2.b Centre of gravity and its calculation.	2.1 Density - Relative density - Archimedes' principle – Buoyancy - Floating bodies - Displacement – Volume of Displacement– TPC – Effect of density on draught of a ship – Fresh water allowance - Coefficient of forms - Wetted surface area. 2.2 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.
Unit – III **Transverse Stability**	3.a Stability of ships. 3.b Metacenter and its calculation. 3.c Free surface effect.	3.1 Stability of ships - Statical stability at small angles of heel - Stable, Unstable and Neutral equilibrium. 3.2 Transverse metacenter - Calculation of KM for rectangular and triangular cross section - Metacentric diagram - Inclining experiment. 3.3 Free surface effect - Effect of tank divisions on free surface - Stability at large angles of heel – Curve of statical stability - Dynamical stability - Stability of wall sided ship.

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – IV **Longitudinal Stability**	4.a Trim, Draught and changes according to GM. 4.b Reserve buoyancy.	4.1 Trim - Centre of flotation - Mean draught – longitudinal metacenter – longitudinal metacentric height – Effect of adding small masses - moment to change trim by one centimeter - Change in draught due to addition of masses - Change in mean draught due to change in density – Bilging. 4.2 Reserve buoyancy - Permeability
Unit – V **Propeller and Rudder**	5a. Propellers and various terminology. 5b. Rudders and forces acting on it.	5.1 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. 5.2 Rudders - Force on rudder - Torque on stock - Angle of heel due to force on rudder - Angle of heel when turning.

5. SUGGESTED SPECIFICATIONTABLE WITH HOURS & MARKS(THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basic geometric concepts ,area and volume.	06	04	03	03	10
II	Hydrostatics and center of gravity.	06	03	03	04	10
III	Transverse stability.	10	04	06	06	16
IV	Longitudinal stability.	10	04	07	05	16
V	Propeller and rudder.	10	04	06	08	18
Total		**42**	**19**	**25**	**26**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised 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 mid sem 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.

6. SUGGESTED LIST OF PRACTICAL/EXERCISES

Not Applicable

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Prepare charts on any of the two units with detailed drawings and markings**

**All units should be included.

8. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

Sr. No.	Unit	Unit Title	Strategies
1	I	Basic geometric concepts ,area and volume.	Real life examples. Demonstration of real systems. Movies/Animations. Numerical.
2	II	Hydrostatics and center of gravity.	
3	III	Transverse stability.	
4	IV	Longitudinal stability.	
5	V	Propeller and rudder.	

9. SUGGESTED LEARNING RESOURCES

List of Books:

Text Book:

1. Naval Architecture for Marine Engineers By E.A.Stokes
2. Naval Architecture and ship construction By Vikram Gokhle and N.Nanda

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Reference Books:

1. Basic Ship Theory, Vol - I and Vol – II By Rawson and Tupper
2. Naval Architecture By Taylor
3. Naval Architecture by Bian Baxter

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

FACULTY MEMBERS FROM POLYTECHNIC

- **Prof Nair Gopikrishnan**
  (Lecturer in Marine engineering Govt Polytechnic Diu)

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