

B. TECH. COURSE IN NAVAL ARCHITECTURE AND SHIPBUILDING

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B. TECH. COURSE IN NAVAL ARCHITECTURE AND SHIPBUILDING

1.1 INDEX

SUBJECT	CODE
1. HUMANITIES:	
Liberal Studies	H1
General Language	H2
2. SCIENCE :	
Mathematics	S1
Physics	S2
Chemistry	S3
Instrumentation	S4
Computer Science	S5
3. ENGINEERING :	
Applied Mechanics	E1
Engineering Drawing	E2
Workshop Practice	E3
Electrical Engineering and Electronics	E4
Fluid Mechanics	E5
Material Science	E6
Applied Thermodynamics	E7
Machine Design	E8
Production Management and Operation Research	E9
4. NAVAL ARCHITECTURE :	
Introduction to Shipbuilding	N1
Theory of Ships	N2
Electrical System on Ship & Shipyards	N3
Ship Design	N4
Strength of Ships	N5
Structural Design of Ships	N6
Marine Engineering and Ship Propulsion Plants	N7
Shipbuilding Technology	N8
Elective (A) in Naval Architecture	NEA

1. 2 ELECTIVE SUBJECTS

- Elective A:**
1. Computer Aided Ship Design
 2. Shipbuilding Materials, Corrosion prevention and protection
 3. Experimental Stress Analysis
 4. Design of Fishing vessels
 5. Welding Techniques
 6. Cargo Handling
 7. Inland Transportation

- Elective B:**
1. Advanced Computer Techniques
 2. Computer, Applications in Shipbuilding Technology
 3. Experimental Techniques on Ships & Models
 4. Design of Fishing system
 5. Finite Element Method
 6. Offshore Structure Design
 7. Refrigeration & Airconditioning of Ships



1.3 COURSE CONTENT

1st Semester

			HOURS PER WEEK			MARKS	
			L	T	P	E	S
01	S1	Mathematics	3	2	—	100	100
01	S2	Physics	3	—	—	100	100
01	S3	Chemistry	3	—	—	100	100
01	E1	Applied Mechanics I	4	2	1	100	100
01	E2	Engineering Drawing	—	—	5	—	100
01	E3	Workshop Practice I	—	—	4	—	100
01	N1	Introduction to Ship building Visits	3	$\frac{1}{2}$	$\frac{1}{2}$	100	100
			—	—	2	—	—
			16	4 $\frac{1}{2}$	12 $\frac{1}{2}$	500	700
Total :				33		1200	

2nd Semester

02	H1	Liberal Studies	2	1	0	100	100
02	S1	Mathematics	3	2	0	100	100
02	E1	Applied Mechanics II	3	1	1	100	100
02	E2	Engineering Drawing II	—	—	5	—	100
02	E3	Workshop Practice II	—	—	4	—	100
02	E4	Electrical Engineering & Electronics	2	1	1*	100	100
02	N2	Theory of Ships I	2	1	4	100	100
			12	6	15	500	700
Total :				33		1200	

* include visits on board ships

- L : Lectures
- T : Tutorials/Testpapers
- P : Practicals/Laboratory Work
- E : Marks for Semester examination
- S : Sessional Marks

3rd Semester :

		HOURS PER WEEK			MARKS	
		L	T	P	E	S
03	H1 Liberal Studies	4*	—	—	100	—
03	H2 German Language	—	—	3	—	100
03	S4 Instrumentation	2	—	2*	100	100
03	S1 Mathematics	3	2	—	100	100
03	E1 Applied Mechanics III	2	1	1	100	100
03	E5 Fluid Mechanics I	2	2	2	100	100
03	N2 Theory of Ships II	3	—	4*	100	100
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		16	5	12	600	600
Total :		33			1200	

4th Semester :

		L	T	P	E	S
04	H2 German Language	—	—	4	—	100
04	S1 Mathematics	3	1	—	100	100
04	E1 Applied Mechanics IV	4	1	1	100	100
04	E5 Fluid Mechanics II	2	1	1	100	100
04	E6 Material Science	3	1	3	100	100
04	N2 Theory of Ships III	4	—	4*	100	100
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		16	4	13	500	600
Total :		33			1100	

*Includes tests and assignments

5th Semester :

		L	T	P	E	S
05	S1 Mathematics	3	2	—	100	100
05	E7 Applied Thermodynamics	3	2	1	100	100
05	E8 Machine Design	3	1	3	100	100
05	N2 Theory of Ships IV	4	—	4*	100	100
05	N3 Electrical systems on ships and shipyards	3	—	2*	100	100
	Model Making	2	—	—	—	—
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		18	5	10	500	500
Total :		33			1000	

*Including Tests, and Tutorials

6th Semester :

		HOURS PER WEEK			MARKS	
		L	T	P	E	S
06	S1 Mathematics	4	—	2*	100	100
06	S5 Computer Science	2	1	1	—	100
06	N4 Ship Design I	2	—	2*	100	100
06	N5 Strength of Ships I	3	—	3*	100	100
06	N6 Structural Design of Ships I	2	—	4*	100	100
06	N7 Marine Engineering & Ship Propulsion Plant	4	—	2*	100	100
	Model Making	1	—	—	—	—
		18	1	14	500	600
Total:			33			1100

*Includes tests & tutorials

7th Semester :

		L	T	P	E	S
07	E9 Production Management & Operation Research	2	2	—	100	100
07	N4 Ship Design II	3	—	8	100	100
07	N5 Strength of Ships II	3	2	2	100	100
07	N6 Structural Design of Ships II	2	1	2	100	100
07	N8 Shipbuilding Technology I	4	—	2	100	100
		14	5	14	500	500
Total:			33			1000

8th Semester :

		L	T	P	E	S
08	N4 Ship Design III	—	5	12*	—	200
08	N8 Shipbuilding Technology II	2	2	—	100	100
08	NEA Elective 1	2	1	—	100	100
08	NEA Elective 2	2	1	—	100	100
	Project Work	—	—	6	—	250
		6	9	18	300	750
Total:			33			1050 1000

2. SYLLABI

2.1 FIRST SEMESTER

01 S1 MATHEMATICS:

1. FUNCTIONS

- .. definitions
- .. ways of representing functions
- .. basic elementary functions and elementary functions
- .. algebraic functions

2. SEQUENCES AND SERIES

- .. sequences
- .. series
- .. convergence tests

3. VECTOR ALGEBRA

- .. scalars and vectors
- .. rectangular components
- .. scalar and vector products
- .. triple products
- .. applications

4. ANALYTIC GEOMETRY

4.1. Plane co-ordinate geometry

- .. cartesian co-ordinate system and polar co-ordinate system
- .. angles between pairs of lines, triangles, polygons
- .. curves in a plane circle, parabola, ellipse, hyperbola etc and their general equations

9th Semester :

	L	T	P	E	S
09 NEB Elective 1	2	1	--	100	100
09 NEB Elective 2	2	1	--	100	100
	<u>4</u>	<u>2</u>	<u>--</u>	<u>200</u>	<u>200</u>

Total: 6 400

Project Work:

Internal Assessment : 300
 External Assessment : 300

Viva Voce Examination

Internal : ~~75~~ 100
 External : ~~75~~ 100

750 800

*Including tests & tutorials

**Internal & External Assessment 125 marks each

100 1200

4.2. Geometry of space

- .. Cylindrical and spherical co-ordinate systems
- .. direction cosines, direction ratios, angle between lines, shortest distance between skew lines
- .. straight lines, plans
- .. surfaces of revolutions (ellipsoid, paraboloid etc)

01 S2 Physics

1. ELEMENTARY IDEAS

- .. units and dimensions, introduction to S. I. units
- .. mass, weight, force, work energy
- .. conservation of energy
- .. momentum, impulse

2. WAVE MOTION

2.1 Introduction

- .. wave theory of light, Huygens' theory

2.2 Interference

- .. coherent sources
- .. conditions for permanent interference

2.3 Diffraction

- .. diffraction at a straight edge
- .. diffraction grating

2.4 Simple harmonic motion

- .. equation of progressive waves
- .. resonance beats
- .. Doppler effect

- 2.5 Noise, sound levels, ultrasonics
- 2.6 Principles of SONAR
- 3. MAGNETISM AND ELECTRICITY
 - 3.1 Magnets
 - .. magnetic poles
 - .. fields
 - .. Colomb's law
 - .. field intensity
 - .. flux density
 - 3.2 Cycles of magnetisation
 - .. hysteresis
 - .. induction
 - .. Gauss' theorem
 - 3.3 Magnetic field due to a current carrying straight conductor. Laplace's law
 - 3.4 Field and flux density at a point along the axis of a
 - .. circular coil carrying current
 - .. solenoid carrying current
 - 3.5 Torque on a magnet; the ampere; the force and torque on a coil placed in a magnetic field
 - 3.6 The earth's magnetic field, magnetic compass
 - 3.7 Electric charge
 - .. force between charges
 - .. electric field
 - .. electric potential
 - .. equipotential surfaces
 - 3.8 Capacitance
 - .. capacitors
 - .. dielectric strength
 - 3.9 Electro magnetic induction
 - .. self induction
 - .. mutual induction
 - .. Thomson effect

3.10 Thermo-electricity

- .. Seebeck effect
- .. Peltier effect

4. Nuclear energy and its applications

4.1 Radio activity

4.2 Nuclear transformations

4.3 Nuclear fission and fusion

4.4 Energy released, chain reaction

4.5 Nuclear reactors

01 S3 CHEMISTRY

1. Production of engineering materials

1.1 Production of steel

- .. Bessemer converter process
- .. open hearth process
- .. electric furnaces
- .. oxygen process
- .. chemical additions to steels

1.2 Production of non-ferrous alloys

1.2 1 Production of aluminium and its alloys

1.2 2 Production of other non-ferrous alloys

- .. bronze
- .. brass
- .. special reference to the requirements of shipbuilding
(ships propellers etc)

1.3 Plastics

- .. formation of high polymers
- .. thermoplastic and thermosetting resins
- .. methods of fabrication of plastics
- .. production of GRP - materials

2. Fuels

2.1 Coal

2.2 Petroleum

- .. fractionation
- .. refining
- .. methods of cracking

2.3 Diesel fuels

- .. properties
- .. production

2.4 Fuel oils

- .. properties
- .. production

2.5 Nuclear fuels

3. Corrosion and corrosion control

3.1 Corrosion

- .. theories of corrosion
- .. factors influencing corrosion
- .. atmospheric corrosion
- .. corrosion due to immersion in liquids
- .. electro-chemical nature of corrosion
- .. galvanic corrosion
- .. stress corrosion

3.2 Corrosion control

3.2.1 Cathodic protection

- .. sacrificial anode systems
- .. Impressed current systems
- .. reference to Lloyds Rules

3.2.2 Protective coatings

- .. protection by means of paints
(surface preparation, types of paints, composition
and properties)
- .. protective metal or plastic coatings

01 E1 APPLIED MECHANICS I

1. Introduction

- .. definition of forces and moments
- .. equivalent forces and moments
- .. resultants and equilibrium

2. Forces in 2-dimensions

- .. concurrent and non concurrent forces
- .. composition and resolution of forces
- .. funicular polygon and uses
- .. couples and moments

3. Forces in 3 - dimensions

- .. equivalent forces and moments
- .. equilibrium conditions

4. Plane structures

- .. elements
- .. supports and types of joints
- .. determination of the reactions at supports and joints of beams

5. Sectional forces and moments on beams

- .. shear force
- .. bending moment
- .. BM and SF - diagrams

6. Centre of gravity

- .. body
- .. area
- .. line

7. Second order moments of areas

- .. definition
- .. calculation for simple sections
- .. transformation on parallel axes
- .. transformation on rotated axes