NATIONAL CADET CORPS

HEAD QUARTERS DG NCC

National Cadet Corps

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THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, Having Solemnly Resolved To Constitute India Into A [1][SOVEREIGN SOCIALIST

SECULAR DEMOCRATIC REPUBLIC] And To Secure To All Its Citizens :

JUSTICE, Social, Economic And Political;

LIBERTY Of Thought, Expression, Belief, Faith And Worship;

EQUALITY Of Status And Of Opportunity; And To Promote Among Them All

FRATERNITY Assuring The Dignity Of The Individual And The[2] [Unity And Integrity Of The Nation];

IN OUR CONSTITUENT ASSEMBLY This Twenty-Sixth Day OfNovember, 1949, Do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

[1]Subs, By The Constitution (Forty-Second Amendment) Act.1976, Sec.2, For "Sovereign Democratic Republic" (W.E.F. 3.1.1977)

[2]Subs, By The Constitution (Forty-Second Amendment) Act. 1976, Sec. 2, For "Unity Of The Nation" (W.E.F. 3.1.1977)

THE CONSTITUTION OF INDIA

Chapter IV A
FUNDAMENTAL DUTIES

ARTICLE 51A

Fundamental Duties - It Shall Be The Duty Of Every Citizen Of India-

To Abide By The Constitution And Respect Its Ideals And Institutions, The National Flag And The National Anthem;
To Cherish And Follow The Noble Ideals Which Inspired Our National Struggle For Freedom;
To Uphold And Protect The Sovereignty, Unity And Integrity Of India;
To Defend The Country And Render National Service When Called Upon To Do So;
To Promote Harmony And The Spirit Of Common Brotherhood Amongst All The People Of India Transcending Religious, Linguistic And Regional Or Sectional Diversities;
To Renounce Practices Derogatory To The Dignity Of Women;
To Value And Preserve The Rich Heritage Of Our Composite Culture;
To Protect And Improve The Natural Environment Including Forests, Lakes, Rivers, Wild Life And To Have Compassion For Living Creatures;
To Develop The Scientific Temper, Humanism And The Spirit Of Inquiry And Reform;
To Safeguard Public Property And To Abjure Violence;
To Strive Towards Excellence In All Spheres Of Individual And Collective Activity So That The Nation Constantly Rises To Higher Levels Of Endeavour And Achievement;
[1](K) Who Is A Parent Or Guardian To Provide Opportunities For Education To His/Her Child Or, As The Case May Be, Ward Between Age Of Six And Forteen Years.

[1]Ins. By The Constitution (Eighty - Sixth Amendment) Act, 2002 S.4 (W.E.F. 12.12.2002)

NATIONAL ANTHEM

Jana Gana Mana Adhinaayak Jaya Hey,

Bhaarat Bhaagya Vidhaataa

Panjaab Sindhu Gujrat Maraatha

Draavid Utkal Banga

Vindhya Himaachal

Yamuna Ganga,

Uchchhal Jaladhi Taranga

Tav Shubh Naamey Jaagey

Tav Shubh Aashish Mange

Gaayy Tav Jaya gaathaa

Jana Gana Mangal Daayak

Jaya Hey Bhaarat

Bhagya Vidhaataa

Jaya Hey, Jaya Hey,

Jaya Hey, Jaya Jaya Jaya, Jaya Hey.

Preface

1. National Cadet Corps (NCC) came into existence on 15 July 1948 under an Act of Parliament. Over the years, NCC has spread its activities and values across the length and breath of the country, in schools and colleges in almost all the districts of India. It has attracted millions of young boys and girls to the very ethos espoused by its motto "Unity and Discipline" and moulded them into disciplined and responsible citizens of the country. NCC has attained an enviable brand value for itself in the Young India's mind space.

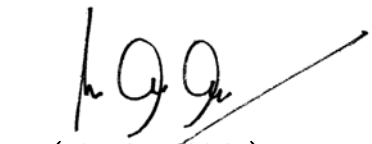
2. National Cadet Corps (NCC) aims at character building and leadership in all walks of life and promotes the spirit of patriotism and National Integration among the youth of the country. Towards this end, it runs a multifaceted training, varied in content, style and processes with added emphasis on practical training, outdoor training and training as a community.

3. With the dawn of Third Millennia, there have been rapid strides in technology, information, social and economic fields bringing in a paradigm shift in the learning field too, NCC being no exception. A need was felt to change with times. NCC has introduced its New Training Philosophy, catering to all the new changes and developments taking place in Indian Society. It has streamlined and completely overhauled its training objectives, syllabus, methodology etc thus making it in sync with times. Subjects like National Integration, Personality Development and Life skills, Social Awareness etc have also been given prominent thrust.

4. Naval Wing specialised syllabus has been designed to generate interest among students about the defence forces and Indian Navy in particular.

5. The syllabus has been revised to make it cadet friendly, colourful, visually appealing with large number of photographs, charts, pictures etc. It is hoped that this will facilitate better assimilation and increased interest among the cadets.

6. Contents of this hard work must form the basis of Institutional Training with explicit commitment.



(Vinod Vashisht)
Lieutenant General
Director General
National Cadet Corps

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CHAPTER - I

NAVAL ORIENTATION

SECTION- 1

TYPES OF WARSHIPS AND THEIR ROLE

1. **Introduction**. Ships are designed for specific role. Indian Navy has various class and types of Ships, Submarines and aircraft for deployment to meet requirements of the nation. Ships can be classified into types and classes.

(a) **Types of Ships**. Ship can be classified under a type based on the role and the purpose for which she has been built. For example an Aircraft carrier is built to operate aircrafts and submarines are built to operate under water.

(b) **Class of Ships**. Ships of the same type can be grouped into classes based on their design and built i.e. similar ships built on same design belong to a particular class.

2. Type and Classes of Ships in the Indian Navy.

Type	Class	Names
Aircraft Carrier	Kiev Class	Vikramaditya
Destroyers	1) Rajput Class	Rajput, Rana, Ranjit, Ranvir, Ranvijay
	2) Delhi Class	Delhi, Mysore, Mumbai
	3) Kolkata Class	Kolkata, Kochi, Chennai
Frigates	Godavari Class	Ganga, Gomati
	Bhramaputra Class	Brahmaputra, Beas, Betwa
	Talwar Class	Talwar, Trishul, Tabar,Teg,Trikhand
	Shivalik Class	Shivalik, Satpura, Sahyadri
Corvettes	Khukri Class	Khukri, Kuthar, Kirpan, Khanjar, Kora, Kulish, **Kamorta(asw), Kadmatt(asw)**
Missile Boats	Veer Class	Veer, Nirbhik, Nipat, Nishank, Nirghat, Vipul, Vinash, Vibhuti, Nashak,
PE ASW Boats	Abhay Class	Ajay, Abhay, Akshay, Agray
Patrol Vessels	Sukanya class	Sukanya, Suvarna, Sarada, Sujata, Subhadra, Savitri, SaryuSumitra

Mine Sweepers	Karwar Class	Karwar, Kozhikode, Canannore, Konkan, Cuddalore, Kakinada
LPD	Austin Class	Jalashwa
LST(L)	Magar Class	Magar, Gharial
LST(L)	Shardul Class	Shardul, Kesari, Airavat
LST(M)	Ghorpad Class	Ghorpad, Shardul, Sharabh
LCU		LCU L-32 to LCU L-39
Tankers		Jyoti, Shakti, Deepak
Survey ships	Sandhayak class	Sandhayak, Nirdeshak, Nirupak, Investigator, Jamuna, Sutlej, Sarvekshak
Submarines	Foxtrot class	All decommissioned
	Kilo class	Sindhughosh, Sindhuvir, Sindhurakshak, Sindhuraj, Sindhudhvaj, Shindhukeshri, Sindhukiriti, Sindhuvijay, Sindhuratna, Sindhushastra
	Shishumar class	Shishumar, Sankush, Shalki, Shankul
	Nuclear	Chakra ,Arihant
	Project 75(I)Scorpion	Kalveri
Cadet Training Ship	Tir Class	Tir
Diving Support Vessel		Nireekshak
Fast Attack Craft		T 80, T 81, Trinkat, Tillanchang, Tarasa
Oceanographic Research Vessel		Sagardhwani
Sail Training Ship		Tarangini, Sudharshini, Mhadei, Tarini

3. **Role**.

(a) **Aircraft Carrier**. It is a floating air field. It can operate aircraft and helicopters.

(b) **Destroyers**. These ships are lighter than cruisers and they are also general purpose fighting ships. They carry Surface to Surface Missile (SSM), Surface to Air Missile (SAM), gun, rocket launchers, torpedoes and ASW helicopters.

(c) **Frigates**. Frigates are smaller than Destroyers. These are basically escort ships, and are equipped with guns, missiles, torpedoes etc. They are classified as Anti Aircraft Frigate, Anti Submarine Frigate, Multipurpose Frigate etc based on their function and equipment carried onboard.

(d) **Cruisers**. They are ships of surface action. They carry heavy guns, long range missiles, antisubmarine weapons, helicopters etc,.Presently there are no cruiser in the Indian Navy.

(e) **Corvettes**. These ships are lighter than frigates and they are fitted either with antiaircraft weapons or with antisubmarine weapon. These ships have limited endurance.

(f) **Patrol Vessels**. These are lighter vessels for patrolling coastal areas, oil field etc.

(g) **Mine Sweepers**. These ships are fitted with special equipment to detect and sweep mines and keep the sea lanes open by clearing mines laid by enemy.

(h) **LSTs (Landing Ship Tank)**.These ships are specially constructed so that they can beach on shore and off load tanks, troops and other vehicles directly on to the beach.

(j) **LCU(Landing Craft Utility)**.These are smaller landing ships which can beach but cannot carry tanks; they are used to land trucks, jeeps and other utility items. These are small compared to LSTs.

(k) **Tankers**. These ships can store fuel and fresh water and supply it to the fleet at sea by a method know as Replenishment at Sea(RAS), there by increasing the endurance of the ships.

(l) **Submarines**. These vessels can operate under water, i.e. they can navigate and fire their torpedoes in a dived state.

(m) **Survey Ships**. They carry out geographical survey of sea and coastal areas and prepare charts for navigation.

4. **Conclusion.** Indian Navy, in order to fulfill its charter of duties has various types of ships. Each class of Ship has a different role to play during peace and war. This gives flexibility to command for deploying them depending upon kind of mission and threat.

Comprehension Questions.

Q1. What is the difference between Type and Class of Ships?

Q2. Give four examples of four types of frigates in the IN.r

Q3. Describe in 15 words each the re of Aircraft Carrier, Destroyers, Frigates and Cruisers.

Q4. What are the primary weapons carried by a Submarine?

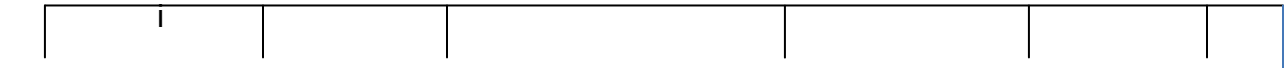
SECTION - 2

ONBOARD ORGANISATION OF SHIPS

1. **Introduction**. Every Warship has schemes of complements which show the number of Officers and sailor, required to man her under various condition of war and peace. Officers and men are divided into departments according to their specialization and these in turn form divisions or may be further divided into two or more sub-divisions, according to the number borne.

2. **Department**. A chart of the departmental organization of a Destroyer along with the specialists borne in each department is given below:-

CAPTAIN



Cdr (E)	Commander	Commander	CDR(Log)	PMO	Met Offr
Snr Engr	DLO	(EXO)	ALOGO(Pay)	MO	
	ALO(P)	First Lt	ALOGO (Vict)	Dental Offr.	
	ALO(R)	Gunnery Officer	ALOGO (Cloth)		Cdr Air
		Navigating Officer			
		Anti Submarine Warfare Officer			
		Signal Communication Officer			
		Regulating Officer			
		NBCDO			
		Shipwright Officer			
		Diving Officer			

3. **Watch System**. The seaman complement on a ship is normally large. It is divided into Forecastle (Foxle), Midship and Quarter Deck division. In war, depending on the threat the whole or a portion of the ships armament must be ready for instant action, to make this possible the ships company is divided into watches. The systems of watches on a naval ship are given below:-

(a) **Two Watches**. In this system the men are equally divided into the two watches that are Starboard and Port.

(b) **Three Watches**. In this system men are divided in three watches Red, White and Blue.

(c) **Four Watches**. In this system men are divided in four watches that are Port I, Port II, Starboard I, Starboard II.

4. **Stations & Routines**. The ships company is closed up in various stations to meet various requirements and routine is so run onboard a ship to balance operational requirement and adequate rest to the crew:-

(a) Cruising Station

(b) Defence Station

(c) Action Station

(d) Sea & Action

(e) SSD & Cable Party

(f) Clear Lower Deck

5. **Conclusion.** A ship is a cohesive unit and is organised in such a way that it runs efficiently both administratively and operationally.

Comprehension Questions.

Q1. What are the main departments on board a ship?

Q2. Why is Ship's Compliment divided into Watch system?

Q3. Explain the types of Watch Systems followed on IN Ships.

Q4. What are the types of stations followed during sailing?

SECTION – 3

BRANCHES OF THE NAVY AND THEIR FUNCTIONS

1. **Introduction**. Indian Navy has the following branches:-

(a)	Executive branch	(d)	Logistics branch
(b)	Engineering branch	(e)	Education branch
(c)	Electrical branch	(f)	Medical branch

2. **Executive Department**. The primary function of this department is to keep the ship in top fighting efficiency. Maintenance of ship's discipline is also the responsibility of this department. The executive department is headed by an officer from the executive branch and he is called Executive Officer. On big ship's he is also known as Ship's Commander. He is also called **Second in Command**, and in the absence of the Commanding Officer, he is in charge of the ship. This department is further divided into following 06 sub branches:-

(a)	Gunnery	(b)	ASW	(c)	Navigation
(d)	Communication	(e)	Regulating	(f)	NBCD
(g)	ATC	(h)	JAG		

3. **Engineering Department**. The primary responsibility of this department is to maintain the propulsion system of the ship and provide propulsion power to the ship as directed by the Commanding Officer. It is also provides assistance to ships NBCD in countering the damage. The HOD of this department is called Engineer Officer(EO).

4. **Electrical Department**. The ship needs electrical supply for domestic purpose i.e cooking, fans, AC, lighting and for operating weapon systems and sensors. This department is responsible for electrical power generation and electrical power supply to the ship borne weapon systems and sensors. The HOD of this department is called the Electrical Officer(LO).

5. **Logistics Department**. The logistics department is responsible to feed the ships company, provide them clothes, looks after their Pay and Allowances, provides spares and stores to Engineering, Electrical and Executive department for effecting repairs/replacement. The HOD of this department is called Logistics Officer (LOGO).

6. **Medical Department**. The primary responsibility of this department is to look after the health of the ships company. A qualified Medical Officer(MO) is posted onboard a ship for this purpose.

7. **Education Branch**. This department consists of officers of Education Branch, Civilians Instructors and a few sailors. These instructors look after class room instruction and examination of academic subjects. They also look after extracurricular activities, take classes for ETI and HET exams and conduct examinations for sailor. This department is headed by Senior Education Officer (SEDO).

8. **Flight**. Some ships have air element like helicopter onboard. Such ships have a separate department called ships Flight. This department is headed by a Flight Commander from the Aviation Branch.

9. **Diving**. Certain ships have complements of divers to undertake emergency diving operation both at harbour and sea to meet unforeseen requirements.

10. **Conclusion** The branches of the Navy are for efficient running of departments when the Officers and Sailors of a particular branch are specially trained to discharge multifarious jobs that they are called upon to perform during their service career.

Comprehension Questions.

Q1. What are the Branches of the navy?

Q2. Explain the functions of each department of a ship in 15 words each.

SECTION - 4

NAVAL CUSTOMS AND TRADITIONS

1. **Introduction**. The tradition and customs of Indian Navy are expression of respect, Courtesy, rejoicing and have developed as part of a sea faring profession with international echo. Some of these are given in succeeding paras.

2. **Commissioning Pennant**. This pennant is hoisted on the main mast on the day of Commissioning of the ship and is not struck down till the ship is decommissioned.

3. **Colours**. This is a general term describing the 'National Flag' and the "Naval Ensign' flown on ship between colours (0800 hrs) to sunset in harbour only.

4. **Illuminating Ship**. Ships are illuminated by flood lights or illuminating circuits on special occasions/ ceremony of festivity as and when ordered by Naval Headquarters/ Administrative Authorities.

5. **Crossing the line Ceremony**. Whenever Indian Naval Ships cross the Equator, this ceremony is observed. The ship goes out of routine and all officers and sailors join the Ceremony.

6. **Piping the Side**. Except for foreign Naval Officers, for whom the side is piped for all times, the side is only piped to the following persons, and only between the times of colours and sunset.

(a) The President and Heads of States.

(b) All the Flag Officers in Uniform.

(c) All Commanding officers of commissioned Ships and Establishments.

(d) The president or a member of a court martial proceeding to or returning from the court.

(e) The officer of the guard when flying a pendant.

(f) A body when being brought onboard or sent out of a ship.

7. **Salutes between Warships**. When a warship passes another in harbor/ sea they exchange salutes. It may include parading of guard and band or by sounding the alert on the bugle or piping the still. At sea, salutes are exchanged by pipe only.

8. **Sunset**. This is a ceremony where, the national Flag and the naval ensign is lowered during Sunset.

9. **Dressing Ship.** The Ship is dressed overall on special occasion like as Independence day, Republic day, National Maritime Day and Navy Day.

10. **OOG**. When a ship visits a foreign port, an officer of the executive branch is detailed as Officer Of the Guard.

11. **Man and Cheer Ship**. The Ships Company man the ship standing on the catwalks from foxle to Quarter deck facing towards the Ship which boards the dignitary.

12. **Ringing in the New Year**. During the midnight 0001 hrs on 01 Jan every year, the ships bell at gangway is rang eight times to mark the New Year.

13. **Reception of Officers**. The officers are received on different ceremonial occasions in the Navy as a tradition.

14. **Launching Ceremony**. This ceremony is conducted whenever the keel of a ship is launched for construction at shipyards.

15. **Entering/ Leaving a Boat**. All officers when getting into or leaving a boat are saluted by the coxswain. Officers enter a boat seniority wise , the senior most enters last and leaves first.

16. **Boat Hailing**. The coxswain of the boat while passing the warship or the boat carrying flag officers give the proper mark of respect after asking the identification being carried by saying boat hails.

17. **Gun Salutes**. Gun salutes are fired as National salute and in harbour for VIPs such as President, Flag Officers, Governors, and Ambassadors etc.

The following are the personnel who are entitled to gun salutes.

(a)	President	21 gun Salutes
(b)	Admiral	17 gun Salutes
(c)	Vice Admiral	15 gun Salutes
(d)	Rear Admiral	13 gun Salutes
(e)	Commodore	11 gun Salutes
(f)	Captain	7 gun Salutes

18. **Conclusion** The customs and traditions of Indian Navy bind the community strongly. Besides being blended into everyday routine, the ceremonies involved are observed with precision and give indication of professional perfection and pride of the white uniform.

Comprehension Questions.

Q1. What is the significance of customs and traditions in the Navy?

Q2. What is man and Cheer Ship?

Q3. Who are given a ‘Piping ceremony’ ?

Q4. What is Gun Salute?

Q5. On what occasions are ships dressed overall?

SECTION – 5

MODE OF ENTRY INTO INDIAN NAVY

1. **Introduction**. Like other Armed Forces of the Nations, Indian Navy is a volunteer force. This lecture gives a detail view of how to join Indian Navy as an Officer or Sailor.

Entry as Officer In The Indian Navy

2. **Executive Branch**

(a) (Permanent Commission)

Sl No	Branch/Type Of Entry	Men /Women	Age Limit (Years)	Educational Qualification
(i)	Cadet Entry (NDA) (UPSC)	Men	16 ½ -19	10+2 or equivalent with Physics & Math
(ii)	Cadet Entry (10+2) B.Tech(INA) (UPSC)	Men	16 ½ -19	10+2 or equivalent with Physics & Math
(iiii)	Graduate Special Entry, Scheme ,CDSE (UPSC)	Men	19 -22	B.Sc. (Physics & Maths) or BE
(iv)	NCC Special Entry Naval Academy	Men	19 -24	B.Sc. (Physics & Maths) or BE with Naval wing.NCC 'C' Certificate
(v)	Direct Entry Naval Armament Inspection Cadre	Men	$19_{1/2}$ -25	Degree in Electronics/ Elect/ Mech Engg. Or post Graduate in Electronics or physics.
(vi)	Direct Entry Law Cadre	Men	22-27	A Degree in Law qualifying for enrolment as an advocate under the Advocates Act 1961 with minimum 55% marks.
(vii)	Logistic Cadre	Men	$19_{1/2}$ -25	BCom/MCom/MA/ BA(Economics), MBA/ BBA/ BBM, MCA/ BCA/ B.Sc.(IT), B

				Tech/ BE, Graduate Degree with post graduate Diploma/ Degree in Material Management/ICWA or Chartered Accountancy.
(ix)	Musician	Men	21-25	**Educational Qualification** A Bachelor's Degree from recognized university (relaxed to Higher Secondary for applicant having exceptional professional ability in music) **Professional Qualification** Ability to play competently at least one military band musical instrument, in addition to the Piano-Forte. Should possess one of the following Diplomas or equivalent:- LRAM/ARCM/ATCL/ **Preferable:-** Experience as a Conductor of an Orchestra/Band or as a Teacher of Music
(x)	Sports	Men	22-2	**Educational Qualification** Regular Post Graduate Degree OR BE/B Tech degree in any field. Candidates with diploma in Sports Coaching from National Instt of Sports and MSc in Sports (Coaching) will be given priority for shortlisting **Sports Qualification** (a) **All sports other than Yachting/Wing Surfing** A candidate should have participated in Sr. level national championships/games in following disciplines **Athletics/Cross-**Country/Triathlon/Badminton /Tennis/Squash/Football/Handball/Hockey/Basketball/Voll

				eyball/Cricket/Swimmming/Diving/Water Polo/Kabaddi/Boxing

(b) (Short Service Commission)

Sl No	Branch/Type Of Entry	Men /Women	Age Limit (Years)	Educational Qualification
(i)	General Service (Executive)	Men	$19_{1/2}$ -25	BE/ B Tech in any Discipline.
(ii)	General Service (Hydro Cadre)	Men	$19_{1/2}$ -25	BE/ B Tech in any Discipline.
(iiii)	Aviation Pilot	Men	19-24	A Graduate Degree with minimum 60% marks in any discipline with Mathematics & Physics at 10+2 level.
(iv)	Avviation Observer	Men/ Women	19 -24	AGraduate Degree with minimum 55% marks in any discipline with Mathematics & Physics at 10+2 level.
(v)	Logistics Cadre	Men / Women	$19_{1/2}$ -25	A First class Degree with minimum 60% marks in any of the followings:- BCom/ BA(Economics), MBA/ BBA/ BBM, MCA/ BCA/ B.Sc.(IT), B Tech/ BE, Graduate Degree with post graduate Diploma/ Degree in Material Management/ICWA or

				Chartered Accountancy.
(vi)	Law Cadre	Men / Women	22-27	A Degree in Law qualifying for enrolment as an advocate under the Advocates Act 1961 with minimum 55% marks.
(vii)	ATC(Air Traffic Control)	Men/ Women	$19_{1/2}$ -25	A first class science graduate with Physics & Maths or Msc with Physics or Math securing min 55% marks.
(viii)	Naval Armament Inspection Cadre	Men	$19_{1/2}$ -25	Degree in Electronocs/ Elect/ Mech Engg. Or post Graduate in Electronis or physics.
(ix)	University Entry Scheme	Men	19-24	Final/ Pre Final Year student of BE/ B Tech in Mech/ Marine/ Aerospace/ Aeronautical/ Production/ Computer Science/ IT/ Control/ Electrical/ Electronics/ Telecommunication min 60% marks till VIth Semester / IVth Semester respectively.
(x)	SSC(IT)	Men	$19_{1/2}$ -25	BE / B Tech (Computer Science / Computer Engg (IT), BSc (IT), MTech (Computer Science), MSc (Computer) BCA/ MCA

3. Education Branch

Sl no	Branch/type of entry	Men /women	Age limit (years)	Educational qualification
(i)	**Permanent Commission**	Men	21-25	A Masters Degree in one of the following with atleast 50% marks. (a) Physics (Math in B.Sc) or (b) Maths (Physics in B.Sc) An Engineering Degree in Mech./ Electrical/ Electronics/ Computer Science/ IT with m,inimum 60% marks
(ii)	**Short Service Commission**	Men/ Women	21-25	-----do----

4. Engineering Branch (Marine Engineers)

Sl no	Branch/type of entry	Men /women	Age limit (years)	Educational qualification
	Permanent Commission			
(i)	Cadet Entry (NDA) (UPSC)	Men	16 1/2 -19	10+2 or equivalent with Physics & Math
(ii)	Cadet Entry (10+2)(Tech)	Men	16 1/2 -19	10+2 or equivalent with Physics,Chem & Maths (Minimum 75% marks in aggregiate of PCM, Minimum 50% marks in English either in 10th or

				12th class.
	Short Service Commission			
(i)	Direct Entry (Technical Branch)	Men	$19_{1/2}$-25	A Degree in Marine/ Mech./ Aeronautical/ Control/ Mettalurgical/ Production Engineer with minimum 55% marks.
(ii)	Direct Entry (Submarine Cadre)	Men	$19_{1/2}$-25	B.E(Mechanical) with minimum 55% marks)
(iii)	University Entry Scheme (UES)	Men	19-24	A Degree in Marine/ Mech./ Aeronautical/ Metallurgical/ Production Engineer with minimum 60% marks up to 6th semester.

5. Engineering Branch (Naval Architects)

Sl no	Branch/type of entry	Men /women	Age limit (years)	Educational qualification
	Permanent Commission			
(i)	Cadet Entry (10+2)(Tech)	Men	17 -19-1/2	10+2 or equivalent with Physics,Chem & Maths (Minimum 70% marks in aggregate of PCM, Minimum 50% marks in English either in 10th or 12th class.
	Short Service Commission			
(i)	Direct Entry (Naval Architecture)	Men/ Women	21-25	B.E in Mech./ Aeronautical/ Mettalurgical/ Civil/ Naval Architecture with minimum

				60% marks.
(ii)	Special Naval Architect Entry Scheme (SNAES)	Men/ Women	19-24	B.E(Naval Architect) with minimum 60% marks)

6. Electrical Branch

Sl no	Branch/type of entry	Men /women	Age limit (years)	Educational qualification
	Permanent Commission			
(i)	Cadet Entry (NDA) (UPSC)	Men	16 1/2 - 19	10+2 or equivalent with Physics & Math
(ii)	Cadet Entry (10+2)(Tech)	Men	17 -19	10+2 or equivalent with Physics, Chem & Maths (Minimum 70% marks in aggregate of PCM, Minimum 50% marks in English either in 10th or 12th class.
	Short Service Commission			
(i)	Direct Entry (Technical Branch)	Men	19 1/2-25	A Degree in Electrical/ Electronics/ Instrumentation & control/ Telecommunication Engg. with minimum 55% marks.
(ii)	Direct Entry (Submarine Cadre)	Men	19 1/2-25	A Degree in Electrical/ Electronics/ Telecommunication control Engg. with minimum 55% marks.

(iii)	University Entry Scheme (UES)	Men	19-24	A Degree in Electrical/ Electronics/Powers/ Instrumentation & control/ Telecommunication/ power system Engg. With minimum 60% marks up to VIth / IV th Semester respectively.

7. **Note:**

(a) Women are eligible to apply for Short Service Commission in Law, ATC, Observer, and Education & Naval Architecture.

(b) The duration of Short Service Commission is 10 years, extendable up to 14 years.

(c) The training of officers selected through the above entries normally commences in the months of Jul/ Jan every year. Advertisements calling for applications from eligible candidates are published in Employment News and important News papers in Apr to Jun and Sep to Nov every year. The selection procedure includes UPSC examination (for NDA, 10+2 Cadet Entry and GSES Scheme), Interview at Service Selection Board and Medical Examination.

(d) University Entry Scheme is applicable for Final Year students only(VII th semester)

(e) The above information is a broad guideline and is subject to change as per the induction requirements of Indian Navy.

8. **For Recruitment Contact**. Any Naval Establishment or DMPR at Integrated Headquarters of Ministry of Defence (NAVY), Sena Bhawan, New Delhi- 110011Tel: 011-2301182 (Officers) & 011-23793067 (Sailors) 011-23010498 (publicity) www.nausena-bharati.nic.in

9. **Entry as Sailor**.

Entry	Branch	Age (yrs)	Educational Qualification	Month of Adv.	Method of Recruitment
Artificers					
AA (Artificer Apprentice)	Electrical/ Mech/ Shipwright	17-20	10+2 or Equivalent with Physics, Chemistry & Maths with minimum 60% marks	Dec & June	Through written examination in science, Maths, English & GK held at AROs/ZROs/ASCs/ NREs twice in a year in Apr/Oct for the courses commencing in Aug/Feb.
DE(DH) (Direct Entry Diploma Holder)	Electrical/ Mech/ Electronics	18-22	Three Year Diploma with minimum 50% marks in Mechanical/ Electrical/ Electronics/ Telecommunication/ Aeronautical/ Ship-building/ Instrumentation/ Engineering/ Mettallurgical from a recognized polytechnic/ Institute.	Dec/ June	Through written examination in Maths, English, GK and additional section as per specialization followed by interview. Held twice a year in Apr/ Oct for courses commencing in Aug/ Feb.

Non Artificers					
SSR(Senior Secondary Recruit)	Seaman/ Communication/Electrical Medical/Engineering/Writer/Store Assistant/ Naval Aviation Sailor	17-21	Minimum 45% aggregate marks in 10+2/equivalent with compulsory subjects maths & Physics with at least one optional subject such as Chemistry or Biology or Computer	Dec/Jan & June/July	Through written examination is English,GK,Maths and Scinece held at ZROs/AROs/ASCs/ NREs twice a year in Apr/Oct for course commencing in Aug/Feb
MR(Matric Recruit)	I-Musicians	17-21	Matric	March/April	Candidates should have aptitude for music and knowledge of at least one musical instrument is mandatory. Recruitment is conducted once a year.
	II-Stewards	17-21	Matric	Dec & June	Through written examination in Maths, English, GK and Science held twice a year in Apr/ Oct conducted by the Naval Recruiting Establishments for courses commencing in Oct/
	III- Cooks	17-21	Matric	Dec & June	

					Apr for both entries.
NMR(Non-Matric Recruit)	Topasses	17-21	VI Class	Dec & June	Through written examination in General Awareness and Arithmetic. Held twice a year in Apr/ Oct conducted by the Naval Recruiting Establishments for courses commencing in Oct/ Apr.
Sports Entries					
Direct Entry (Sports)	Seaman (Acting Petty Officer)	17-21	Matric or Equivalent (can be relaxed)	Dec & Jun	Recruitment is conducted twice a year in Apr/Oct for courses commencing in Aug/ Feb. Exceptionally outstanding sportsmen who have represented international/ National level may contact or write directly to :- **The Secretary, Indian Naval Sports Control Board, Integrated Headquarters of Ministry of Defence (Navy) Room No.8,'C'Wing, Sena Bhawan, New Delhi- 110011 Tel.: 23010562**
SSR (Outstanding Sportsman)	Seaman/ comm./ Elect/ eng/ medical/ writer/ store/ Naval Aviation	17-21	Minimum 45% aggregate marks in 10+2/ equivalent with compulsory subjects math & physics with at least one optional subject such as Chemistry or Biology or Computer.	Dec/Jan & June/ July	
MR (Outstanding Sportsman)	Steward/ Cook	17-21	Matric	Dec & June	

10. **Note**:

(a) The above information is a broad guideline and is subject to change as per the induction requirement of the Indian Navy.

(b) All the Advertisements are published in Employment News and National/ Regional/ Leading News Papers.

(c) Minimum %age of marks, for each entry is promulgated through advertisements for particular batch & may differ from the % age mentioned above.

For further Details and Information, Contact or write to:
The Joint Director, Manpower planning and Recruitment (NRO)
Integrated Headquarters of Ministry of Defence (NAVY),
Sena Bhawan, New Delhi- 110011
Tel: 011-23793067 (Sailors) www.nausena-bharati.nic.in

11. **Conclusion** The Indian Navy is employing cutting edge technology in administration &is operating in a dynamic environment . The recruitment into the Navy is based on selection through merit and calls for bright youth to join this finest service and serve the Nation. It also provides good pay and perks, housing, childrens education and hospital facilities to its service personnel.

(This lecture needs to be supplemented by movies produced by DMPR/ IHQ/ MoD(Navy) periodically for better assimilation by cadets)

Comprehension Questions.

Q1. What are the 10+2 entries of joining the navy as a commissioned officer?

Q2. Which are the branches open to women candidates?

Q3. What is a Graduate Special Entry Scheme?

Q4. What are the entries for sailors?

CHAPTER - II

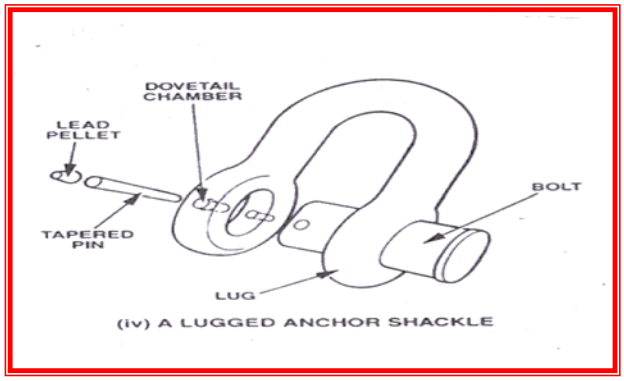
SEAMANSHIP

SECTION-1

RIGGING- INTRODUCTION TO SHACKLES& BLOCKS

1. **Introduction**. Heavy items are required to be lifted by ropes. However, a lot of personnel would be required to lift heavy weights. This can be reduced considerably by the use of blocks, which greatly reduces the effort.

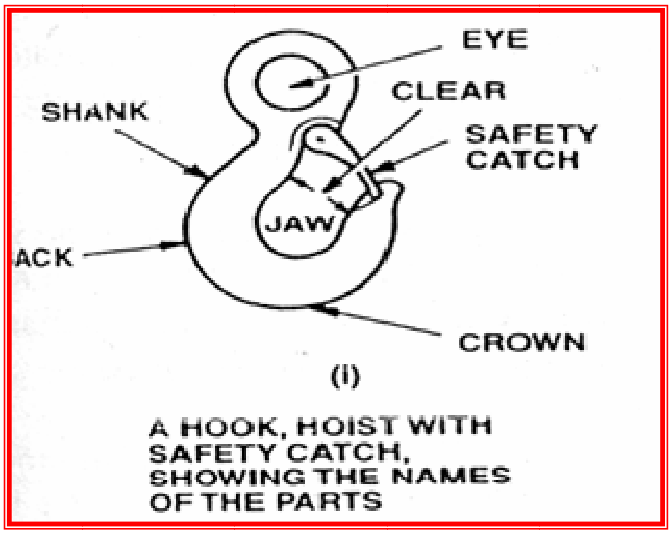
2. **Shackles**. Rigging shackles are coupling links used for joining ropes, webbing, chain together or to some fitting usually forged from carbon – magnesium steel.



(iv) A LUGGED ANCHOR SHACKLE

3. **Types of Shackle**:
   (a) Screw shackle
   (b) Forelock shackle
   (c) Clenched shackle
   (d) Joining shackle
   (e) Joggle Shackle
   (f) Feathered Shackle

4. **Hooks**. Hooks are used at sea for lifting purpose and are much weaker than shackles of similar size. They are usually made of glavanised mild steel .



5. **Types of Hooks**:

(a) Spring hook

(b) Tackle open hook

(c) Swivel spring hook

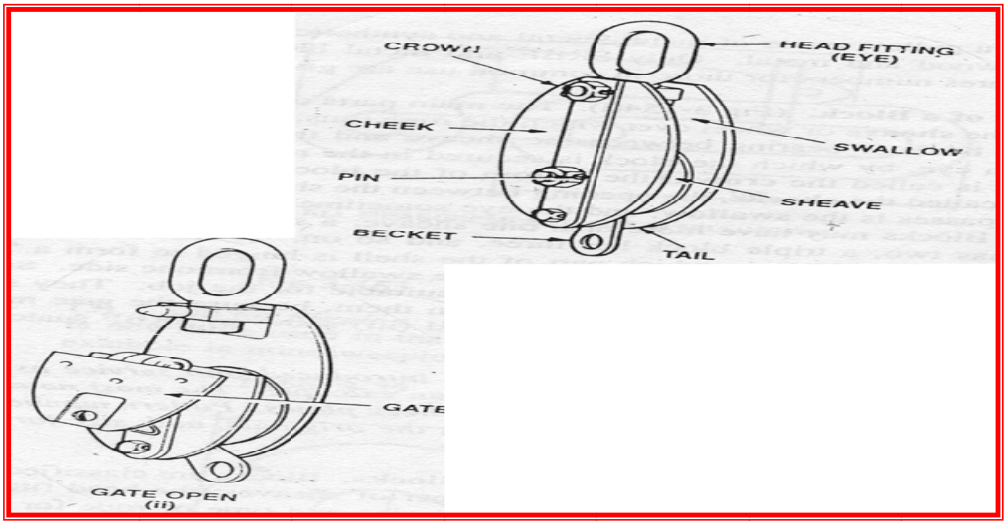
(d) Release hook

(e) Recovery hook

(f) 'S' hook or awning hook

(g) RFD automatic release hook

6. **Block**. Block is a portable pulley, made of metal, metal and synthetic-resin bonded fibre (SRBF) orin some cases wood and metal.



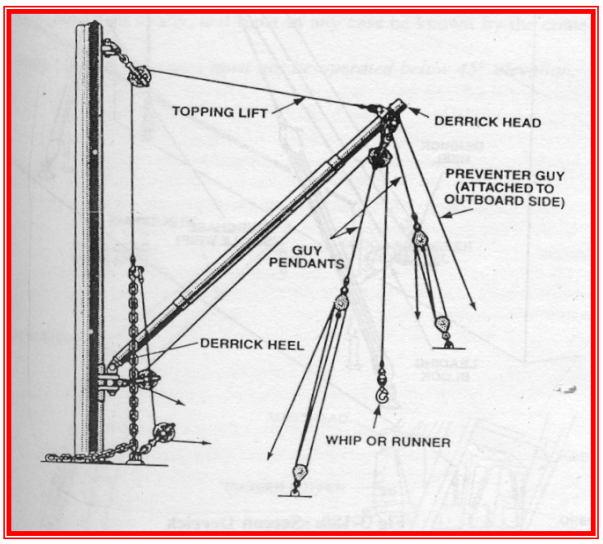
7. **Types of Block**:

(a) Synthetic resin-bonded fibre (SRBF) Block

(b) Metal block

(c) Wooden block

8. **Derrick**. A derrick is a spar, made of wood or steel, rigged as a swinging boom and used for hoisting boats, stores, cargo, ammunition or gear in andout of a ship



9. **Coiling down**. Cordage is very resilient and will absorb a number of turns in its length without becoming snarled if the length is sufficient and the turns correspond with the lay of the rope. Rope of right hand lay is always coiled downright handed, and rope of left-hand lay is always coiled down left handed

10. **Splicing**. Splicing is a method of joining the ends of two ropes together or making an eye at the end of a rope, by interlocking the strands. All splices reduce the strength of a rope by 1/8th.

11. **Types of Splice**:-

(a) Back splice

(b) Eye splice

(c) Short splice

(d) Long splice

(e) Cut splice

(f) Chain splice

12. **Conclusion** Every seamanship evolution onboard involves the use of blocks, hooks and shackles. Knowledge of the various types of shackles and their uses as well as lifting abilities is essential for every seaman.

Comprehension Questions.

Q1. What is used to lift heavy weights?

Q2. List type of shackles.

Q3. What material are hooks made of?

Q4. List type of hooks.

Q5. Make a diagram of a Block and write the parts.

Q6. What is a derrick?

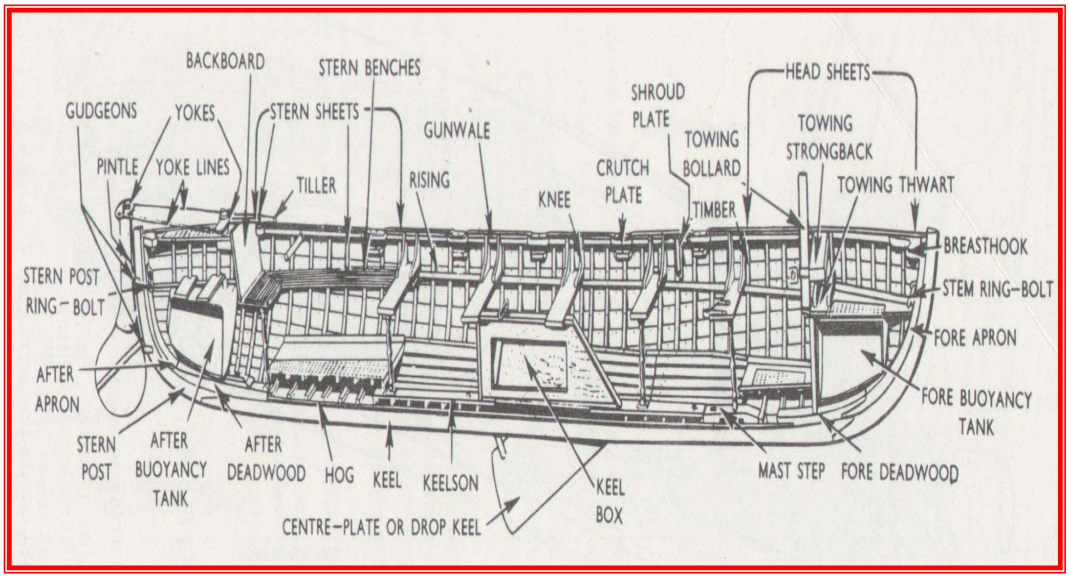
Q7. What are the types of a Splice?

SECTION-2

BOATWORK- PARTS OF BOAT

1. **Introduction**. Ships seldom come alongside. The men move from ship to shore by using their boats, when the ships are at anchorage. Boats can be maneuvered by using oars and sails. Whaler is a commonly used boat in the navy.

2. **Parts of Whaler** Apron, Back board,Badge block, Benches, Bilge,Bilge rails, Bottom board, Bow, Canopy, Capping, Drop keel, Cleats, Crutches, Deck Eyes, Floors, Floor board, Garboard strake, Grating, Gudgeon & pintails, Gunwale, Hog, Keel, Keelson, Mast step & clamp, Pillars, Planking, Plug, Ringbolts, Rowlocks, Rubbers, Rudder, Stem, Stern post, Stern sheet, Stretcher, Tabernacle, Thwarts, Timbers, Wash strake,



3. **Parts of Oar** Copper bands, leather, grip, blade, shaft and loom.

4. **Conclusion** Knowledge of various parts of the boat and oar is very essential while putting the boat to use at sea.

SECTION - 3

BOATWORK- BOAT PULLING INSTRUCTIONS

1. **Introduction**. The boat can move very swiftly if the pulling is synchronized. The coxswain is responsible for ensuring that the crew pulls steadily and together. He is also responsible for steering the boat correctly.

2. **Pulling Orders**.

(a) **Ship your oars**. This is the order to place the oars in the crutches and ready for pulling

(b) **Shove off**. This is the order to shove the boat off with looms of the oars from the ship or landing place alongside which she is lying or from bottom of the boat if grounded

(c) **Give way together**. This is the order to start pulling and it is obeyed together by the whole crew

(d) **Oars**. This is an order to cease pulling

(e) **Hold water**. This is the order to reduce or stop the way of the boat by holding the oars at right angles to the boat and with their blades in water

(f) **Stroke together**. This is the order for all to give one stroke together

(g) **Back together**. This is the order to back water together by pushing on the looms of the oars instead of pulling

(h) **Easy all**. This is the order to pull less vigorously so that the speed of the boat will be reduced. If the boat is being turned the order easy port or easy starboard may be given.

(i) **Mind your oars**. This is the warning to the crew to keep the blades of their oar clear from obstructions

(j) **Eyes in the boat**. This is an order to the crew to keep their gaze from wondering aboard and to pay attention to their duties.

(k) **Bow**. This is an order to the bow man to boat his oar and be ready to fend off the bows of boat with his boat hook

(l) **Boat your oars**. This is the order to unship the oars from crutches and lay them fore and aft in the boat on their respective sides.

3. **Various Essentials in a Pulling Boat**. Plug, Oars, Crutches, Stretches, Rudder, Tiller or yoke, Painter, Towing bollard, Special gear.

4. **Steering/Manning of boat under oars**

Port side – 03 Persons (oars on stbd)

Stbd side – 02 persons (oars on Port)

- If port side crew pull, the boat turns port side
- If stbd side crew pull, the boat turns stbd side
- All crew will face towards coxswain and coxswain faces towards head

5. **Instructions/ precautions while pulling**

(a) Ensure the boat is clear of water

(b) Adequate number of oars & crutches along with spare

(c) Life jacket for all the crew

(d) Check the boat plug

(e) First aid kit

6. **Instruction on Boat pulling**. When a pulling boat is under way any order to the oarsman except hold water is obeyed on completing one full stroke after the order is given. All such orders should be given at the moment when the blades of the oars are in water.

(a) Availability of loud hailer, drinking water, sufficient ropes, bailer, anchor, life buoy and boat hook

(b) Only swimmers and physically fit should participate

(c) Knowledge of local weather and tidal conditions

(d) Rudder, tiller & towing bollard should be properly secured

Boat Pulling

Conclusion.

The whaler carries a coxswain and a crew of 5 pullers. The pulling is to be synchronized by the coxswain with the help of orders. All seaman and pullers are required to know the orders for pulling.

Comprehension Questions.

Q1. List all the parts of a whaler boat.

Q2. Describe briefly the pulling orders?

Q3. What are the various essentials in a pulling boat?

Q4. How many boat pullers sit on port and Starboard side of a whaler?

Q5. What are the precautions required for a boat pulling crew?.

SECTION - 4

BOATWORK- STEERING OF BOAT

(Practical demo to be conducted by PI Staff)

SECTION - 5

BOATWORK- POWER BOATS

1. **Introduction**. Power boats are driven by internal combustion engines and therefore known as Motor boats.They may be classified as inboard or outboard according to the position of the motor. They may also be classified according to speed (fast, medium or slow speed)

2. **Types of power boats**

(a) Gemini crafts

(b) RIBs

(c) GRP Motor Boats

3. **Anchoring a boat**

(a) The length of the cable is normally four time the depth of water

(b) The inboard end of the cable is secured to a towing bollard by taking four turns around the bollard and then seizing the inboard part to the out board part

(c) If a boat snatches at her cable in a heavy sea, pay out as much as cable as possible

4. **Securing of boat**

(a) Heavier boats will be secured alongside

(b) When marking fast to the lower boom, a pulling boat is secured to the quarter lizard the inner being kept for power boat

(c) The painter should be rove through the eye of the lizard then back through the thimble of the painter and then secured with a double sheet bend round both parts

(d) The scope of the painter should be adjusted so that the boat rise easily with out yawing or snatching

(e) Along side jetty or anchor boat

(f) To a boom

(g) To an accommodation ladder

(h) To a buoy

5. **Towing a boat**

(a) A lightly laden boat may be towed in calm weather by her painter which should be made fast with two or three turns around her towing bollard

(b) If no bollard is provided a wooden bar should be passed through the bight of the painter and placed under the two fore most thwarts

(c) A boat should never be towed direct from her stem ringbolt because it puts an unfair strain on the ringbolt and stem

6. **Conclusion** Power boats are used extensively for conveying Captain, officers, crew and stores from ship to shore and back. They are required to be secured properly and can be towed for long durations, with due precaution.

Comprehension Questions.

Q1. What are the types of power boats?

Q2. How is power boat anchored?

Q3. Explain the methods of securing a power.

CHAPTER-III

NAVAL COMMUNICATION

SECTION – 1

SEMAPHORE

1. **Introduction**. Semaphore is a visual means of communication which provides a rapid means for passing messages over short distances during daylight.

2. **Semaphore**. The different semaphore signs are made by moving one or two hand flags so that they form various angles with the perpendicular. It is essential that each angle be formed correctly, as good communication depends upon accuracy in this respect

3. **Alphabet and Special Signs**. The alphabet and the special signs used are shown below. It should be noted that there are no special signs for numerals, which are always spelt out. The numeral sign is used to indicate that the numerals that follow are to be recorded as digits.

(a)	Answering Sign	:	By making 'C'
(b)	Attention Sign	:	By making 'U' and arms waved up and down
(c)	Direction Sign	:	By making 'J'
(d)	Front Sign	:	Made by crossing both flags infront of body (to indicate the end of group or word)
(e)	Error sign	:	Made by succession of E's
(f)	Numerical Sign	:	Right hand at 'D' position,left hand at 'E' Position (Numerals follows)

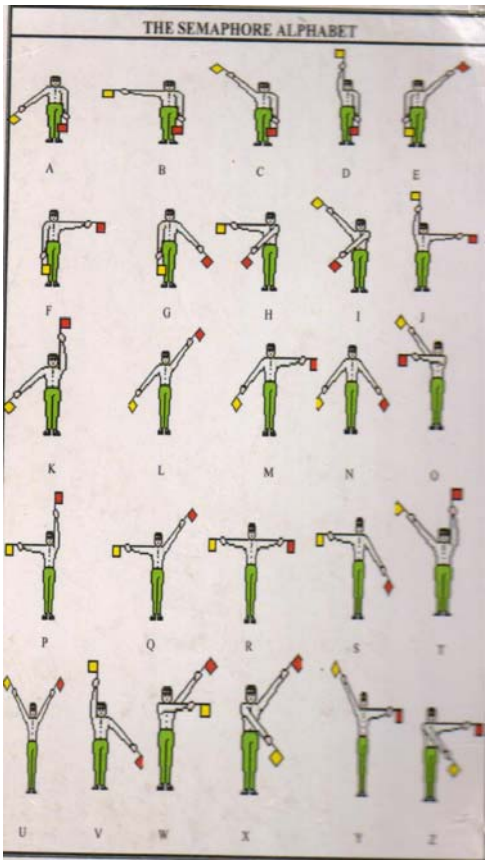
4. **Prosigns used in semaphore**. Prosign is a single letter or a combination of letters which are transmitted as a single character to convey a specific meaning. Some prosigns which are used in Semaphore and their use are given below:

BT	- Break	MIM	- Comma
KN	- (Open Brackets	KK	-) Close Brackets
AAA	– Full Stop	XE	- Slant
DU	- Hyphen	B	- More to follow
C	- Correct	WA	- Word After

WB	- Word before	AR	- End of transmission
II	- Seperative Sign	AS	- Wait

5. **Learning Semaphore**. How to Remember

1st Circle	:	A to G (Single arm signs)
2nd Circle	:	H to N (omitting J, Right hand at A position)
3rd Circle	:	O to S (Rt hand at B Position)
4th Circle	:	T,U,Y (Rt hand at C position)
5th Circle	:	J,V (Right hand at D position)
To complete	:	W,X,Z



6. **Conclusion** All cadets should be trained in Semaphore skills which is highly essential on board ships to communicate with other ships at sea. Semaphore is the most important skill in Indian Naval Communication. It will develop a good sense of concentration.

SECTION - 2

RADIO TELEPHONY PROCEDURE

1. **Introduction**. When signaling by voice, greatest care is to be taken that the message is kept short and to the point. Voice procedure is simple and easily understood

2. **RT Procedure**. When signaling by voice greatest care is to be taken that the message is kept short and to the point. The tendency to carry on a telephone conversation is to be avoided. Voice procedure is simple and easily understood. It is most important that this procedure is used at all times and the instruction in its use is given to all officers and ratings who may have to pass messages by radio telephone. Messages transmitted by voice are not invariably written down, but whenever practical a short note of their purpose should be made. Speech should be clear and slow with natural emphasis on each word. Messages should normally be spoken in natural phrases and not word by word. The phonetic alphabet and pronunciation of figures are to be used when applicable

3. **RT Practical**. Voice procedure should generally be clear to the receiving operator. All the difficult words are to be spelt out. An example of a voice procedure is given below:

Collective DE (This is) Ctrl = Radio Check = K (over)
DE A1 (Alfa One) = Roger = K
DE Ctrl = Roger out.

Time Check: Collective DE Ctrl = When I Say time it will be exactly 1030… 15 seconds… 10 seconds. 5 4 3 2 1 Time 1030 = A1 K
Note: While calling collective we have to control one addressee

4. **Conclusion** The Naval communication has a unique method of Radio Telephony. It is the duty of every cadet to learn simple voice procedures as used in Navy. Messages should be spoken in natural phrase and not word by word. The phonetic alphabet and pronunciation of figures are to be used wherever applicable.

Comprehension Questions.

Q1. Explain Semaphore.
Q2. What are the prosigns used in Semaphore?
Q3. What is RT Procedure?

CHAPTER-IV

NAVIGATION

SECTION- 1

SIMPLE CHART WORK

1. **Introduction**. To a navigator, the most useful chart is the one which can show the track of his ship by drawing one or a series of straight lines between his starting point and destination, and the steady course he must steer in order to arrive there.

2. **Chart Projections.**

(a) **Mercator Projection**. The main properties of a Mercator Chart are:-

(i) A Rhumb line on the Earth appears as straight lines on the chart.

(ii) The Equator appears as a straight line.

(iii) The parallel of latitudes appear as a straight line.

(iv) All Meridians appears as straight line perpendicular to the equator.

(b) **Gnomonic Projection**. In order to assist the navigator in finding the great circle track between two places, charts are constructed so that any straight line drawn on them shall represent a great circle. These charts are known as Gnomonic charts and they are formed by projecting the Earth's surface from the Earth's centre on to the tangent plane at any convenient point. It is so constructed that:-

(i) Great circles appear as straight line and rhomb line appears curved.

(ii) Meridian is curved converging to the poles

(iii) Parallel of latitude is also curved

3. **Chart Scales**. Charts are generally published in three different scales, they are:-

(a) **Small scale charts**. These are charts covering a very vast area and the information such as sounding, lights etc. are not given in detail. These charts are generally used for passage planning and never should be used for navigation.

(b) **Medium scale charts**. These charts are used for passage. The information for navigation including dangers is clearly shown on these charts. These charts cover a general area of about 50 – 70 NM.

(c) **Large scale charts**. These charts are generally of harbours and their approaches. These charts contain all information's required for precise navigation. These charts cover an area of 5 – 7 NM.

4. **Fixing a Ship**. When it is not possible to obtain the ship's actual position by fixing, a position may be worked up based upon the most recent fix.

(a) **Dead Reckoning (DR)**. It is the expression used to describe that position obtained from the true course steered by the ship and her speed through the water and from no other factors. The Dead Reckoning position is represented by the symbol **+**.

(b) **Estimated Position (EP).** This position is the most accurate that the navigator can obtain by calculation and estimation only. It is derived from DR position adjusted for the estimated effects of leeway, tidal stream, current and surface drift. The EP must always remain an approximate position, because these four variable factors are difficult to determine exactly, although experience helps long way to estimate the effect as accurately as possible. It is indicated by triangles and four-figure time.

Step One. Plot the course steered and the speed thorough the water, thus arriving at the Dead Reckoning (DR) position.

Step Two. Plot on from the Dead Reckoning position the effect of:-

(i) Leeway
(ii) Tidal stream
(iii) Current
(iv) Surface drif

Thus arriving at the Estimated Position (EP).

5. **Arrow on Tracks.**

(a) A single arrow denotes course steered, water track, leeway vector.
(b) A double arrow denotes ship's ground track.
(c) A triple arrow denotes tidal stream, current, surface drift and drift.

6. **The various types of charts are**:-

(a) Navigational Chart
(b) Ship`s boat charts
(c) Routing charts
(d) Magnetic charts
(e) Ocean sounding charts
(f) LD charts (lattice Decca)
(g) Astronomical charts and diagrams

7. **Various information shown on charts are**:-

(a) Number of chart
(b) Title of the chart
(c) Survey data
(d) A source data diagram
(e) Date of publication
(f) New edition
(g) Date of printing
(h) Chart dimension
(j) Scale of the chart
(k) Abbreviations & symbol
(l) Heights
(m) Drying heights
(n) Tidal stream information

8. **Conclusion** Charts are used to plot ships course and also for planning passage from one place to another. Large Scale Charts cover small area whereas Small Scale charts cover large areas. A lot of information is given on the charts which are used for accurately positioning the ship.

Comprehension Questions.

Q1. Define Navigation.

Q2. Explain types of chart projections.

Q3. Describe Chart Scales.

Q4. If unable to obtain a fix, how is the position of a ship estimated?

Q5. List type of charts.

Q6. What is the information shown on a chart?

SECTION- 2

ELECTRONIC AIDS FOR NAVGATION

1. **Introduction**. The ancient Navigator had to rely on visual lookouts to aid his passage by hailing presence of land or other objects. Today's Navigator has a lot of electronic aids which help him in finding his position as well as the surroundings, even in conditions of low visibility.

2. **RADAR**. Radio aided Direction and ranging i.e. with the help of radio waves, the direction and range of objects are obtained. The radar plays a very important role in Navigation and Directions.

RADAR

3. Three types of Radars used in Navy.

   (a) Air warning Radar to detect approaching enemy aircrafts.

   (b) Radar to detect surface crafts and ships

   (c) Radar used for navigation, for controlling Guns, missiles and helicopters

4. **RACON**. Radar responders, or radar transponder beacons, are receiver/ transmitter transponder devices used as a navigation aid, identifying landmarks or buoys on a ship board marine radar display. A RACON responds to a received radar pulse by transmitting an identifiable mark back to the radar set. The displayed responds has a length on the radar display corresponding to a few nautical miles, encoded as a Morse character beginning with a dash for identification.

5. **Other Aids**. RAMARKS are radar beacons, which transmit independently without having to be triggered by the ships RADAR. A RAMARK response on a radar display gives no indication of distance, but instead extends from the ships position to the circumference of the display. Various types of Navigational aids are as follows:-

(a) **Log.** It is used for calculating the speed and distance travelled through water.

EM Log

(b) **Echo Sounder**. It is an instrument by which depth of the water can be measured below the keel of the ship. This helps us to prevent the ship from grounding.

Echo Sounder

(c) **Anemometer.** It is used to find the relative wind speed at sea. The modern anemometer gives both relative and true wind speed.

6. **Global positioning system (GPS)** is one of the most important modern Navigational Aid. These help us to locate our position to the accuracy of a few hundred meters. All sea going vessels are suppose to have GPS fitted onboard for navigation. Modern navies even use GPS for accurate launching of ballistic and continental missiles. GPS functions using 14 satellites located at different places in the space. An user gets feed from the various satellites in his range and then gives the position after inter relating all the feeds. This is not fully accurate and must not be fully dependant for navigation. We must also do plotting to cross check the position given to us by GPS for errors.

7. **Conclusion** Use of electronic aids has enhanced the accuracy of Navigation. A Navigator has to be conversant with the operation of all electronic aids available on the ship.

Comprehension Questions.

Q1. What is the full form of RADAR and its use?

Q2. Explain GPS?

Q3. What is the use of an Echo Sounder on a ship?

CHAPTER-V

SHIP AND BOAT MODELLING

SECTION- 1

TYPES OF MODELS

1. **Introduction** Models are of different types like Solid Model, Working Model or a Sailing Model

2. **Solid Model**. A solid model is one made with solid block of wood including the appendages and additional parts attached post preparation of the basic structure. The solid models are basically scaled to originally planned ship for purposes of show and testing / trials.

3. **Working Model**. Working Model for the boat is a scaled model with all parts moving with mechanical or electrical support. The working model is designed to project the actual working of the boat.

4. **Sailing Model**. Sailing models are generally scaled models with sails and motor fitted for control of the sail model remotely.

Stablising of Models

5. One of the big advantages in ship modelling is that almost anything will float, and with sufficient power it can be propelled through the water. This provides satisfaction to the casual model maker.

6. A model's first contact with the water usually comes some time before the last coat of paint is dry and the last details are fitted, however, it is far more practical to test the model during construction, since alteration of subsequent position of components becomes a major operation. The time for this is normally after the initial two or three coats of paints and, if possible, before permanent attachment of the deck and superstructure.

7. Mark the water line at stem and stern with pencil marks, and place components, or equivalent weights in correct position and check that the hull floats true. If after completion, ballast is required to bring the model down to her marks or to correct trim,

determine the required amount and its position by stacking cut chunks, flakes and shots of lead in place, then melt the lead in to a convenient block and place or screw, to the hull bottom as low as possible.

8. But for other types of hull like planked hull or hard chine hulls, where the bulkheads are used for making watertight compartments and are glued with the keen, this process should be carried out in the manner explained. After stacking the flakes or shots in the correct position between the bulkheads, melt the lead and make the blocks according to the space available and then place/ glue them as near as possible to the keel.

Comprehension Questions.

Q1. What are the types of ship models?

Q2. What is the method of stabilising a ship model?

Q3. Describe a Solid Ship Model.

SECTION-2

INTRODUCTION TO SHIP MODEL COMPETITION

1. **Introduction**. SM Competitions are held between Dtes. as part of RD Banner Competitions. This lecture is aimed at apprising cadets on various types of competitions held and criteria for judging models.

2. **Competitions**. SM competitions are held during following camps :-

   (a) RDC

   (b) NSC

   (c) ATC SW

3. **Types of Models**:-

   (a) Camp Model

   (b) Dte. Model

   (c) VIP Model

4. **Camp Model**. Camp Models are made during a particular camp within a specified period as per admin instructions/ ADJI of respective Camps. The type of model is usually power model.

5. **Dte. Model**. These models are made during preparatory camps prior to actual camp where competitions are held. The types of model are usually sailing, RC and Open Class.

6. **VIP Model**. Solid Model made prior to the camp which may carry specific marks towards RD Banner Competition.

7. **Criteria for Evaluation**. The criteria for marking a particular model would depend on type of model as follows:-

   (a) **Static**. (i) Proximity to the drawing

   (ii) Model Dimension to the scale

(iii) Fittings

(iv) Elegance

(b) **Stability**. (i) Draught and Trim

(ii) List

(iii) Righting Moment

(c) **Performance**. Power/RC/ Sail model are assessed for operational performance through a straight run and or turning circle.

(i) **Straight Run**. The Model is made to run to a Centre Mark at the middle of the tank from the opposite side. Graduations of 6” are made on either side of the centre mark representing loss of one mark each.

(ii) **RC Model**. It is made to do a run between marker buoys in fixed pattern. Accuracy is measured by not touching the sides or buoys and speed of the model taking minimal time.

(ii) **Sailing Model**. All models are made to do a run from one side of the tank to the other powered by sails alone. The model taking minimal time is judged first and timing is taken from that model.

8. **Conclusion** Ship and Boat Modeling by cadets requires application of skills, patience and attitude for perfection. Various competitions are held during Annual Camps in order to evaluate the degree of excellence achieved by cadets in an objective manner.

SECTION - 3

CARE AND HANDLING OF POWER TOOLS USED

1. **Introduction**. Besides carpentry tools, Power tools are also used for Ship Modeling. Power tools such as jigsaw Machine, drilling, grinding, buffing set, lathe set, wood turning set, saw and groover set, sanding and polishing set etc. are expected to produce accurate work pieces not only when the machine is new but throughout its working life. For this reason the wear of the machine must not exceed certain limits, it must be watched and parts which are faulty due to wear or other damage must be replaced or repaired without delay. Therefore, repair and maintenance work must be carried out in accordance with preventive maintenance schedules.

2. **Maintenance and care of Power Tools used in Modelling**:-

(a) Polythene/ canvas dust covers are to be used to cover the machines and equipment when not in use to protest them against dust and moisture.

(b) The user should be instructed to clean the machine after use with a hand brush. Slide ways are to be oiled to avoid condensation of moisture and then to cover the machine with dust cover.

(c) Each machine must have its tool cup-board for keeping all the accessories required for use.

(d) Cadets should be taught the use of the various controls and the correct manipulation of the machine before the commencement of any skill training of the machine.

(e) A check list/ store list showing all the items kept in the tool cup-board is to be displayed in a prominent place inside the cup-board.

3. **Tools for Ship Modeling**.

(a) Tap Hammer

(b) Nose Plier

(c) Cutting Plier

(d) L Square

(e) Junior Hacksaw

(f) Pincar

(g) Jack Plane

(h) Bench Vice

(i) Pin Cutter

(j) End Cutter

(k) Hacksaw

(l) Tenon Saw

(m) Steel Scale

(n) Rough File

(o) Scissors

(p) File Set

(q) Adjustable Spanner

(r) Drilling Machine

(s) Chisel

(t) Fret Saw

4. **Conclusion** Power tools used in ship modelling are for better finish, speed of execution and mass production. However, the machines needs to be kept operational and cadets must be trained to handle them with confidence for optimal exploitation, otherwise mishandling causing accidents leading to loss of material or injury.

Comprehension Questions.

Q1. List important tools required for making ship models.

Q2. List suitable types of wood required for making ship models.

Q3. What types of adhesive is used in ship modeling?