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.

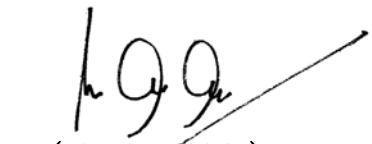
2. National Cadet Corps (NCC) aims at character building and leadership in all walks of life and promotes the spirit of patriotism and National Integration among the youth of the country. Towards this end, it runs a multifaceted training, varied in content, style and processes with added emphasis on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

LESSON PLAN - N1(SD/SW)

ONBOARD ORGANISATION OF SHIPS

Period - One

Type - Lecture

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction - 05 min

(b) Department -10 min

(c) Watch System -10 min

(d) Station and Routine - 10 min

(e) Conclusion -5 min

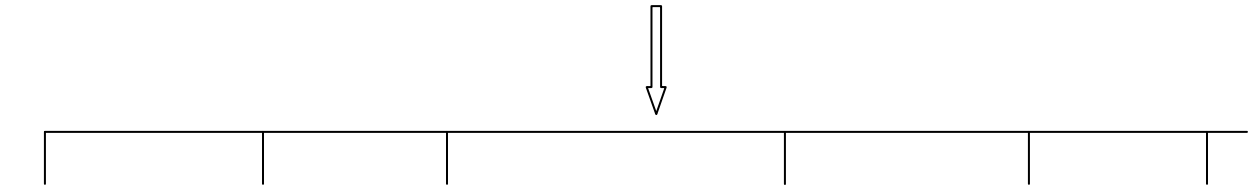
INTRODUCTION

3. Every Warship has schemes of complements which show the number of Officers and men 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.

DEPARTMENT

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

CAPTAIN



Cdr (E)	Cdr(L)	CDR	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)		
		Navigating Officer			
		Anti Submarine Warfare Officer			
		Signal Communication Officer			
		Regulating Officer			
		NBCDO			
		Shipwright Officer			
		Diving Officer			

WATCH SYSTEM

5. 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.

STATIONS & ROUTINES

6. 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

CONCLUSION

7. 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?

LESSON PLAN: N -2

MODE OF ENTRY INTO INDIAN NAVY

Periods - Two

Type - Lecture/Movie

Term - I (SD/SW)

Training Aids

1. Computer slides, Movies, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	- 05 min
	(b)	Executive Branch (Permanent Commission)	- 20 min
	(c)	Short service commission	- 20 min
	(d)	Education Branch	-15 min
	(e)	Engineering Electrical Branch	-15 min
	(f)	Sailors Entry	- 15 min
	(g)	Movie, Notes and conclusion	- 30 min

INTRODUCTION

3. 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

4. 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/Volleyball/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

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----

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.

ENGINEERING BRANCH (NAVAL ARCHITECTS)

Ser 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)

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.

IMPORTANT NOTES

5. Following are important notes :-

(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, extended 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.

6. **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

ENTRY AS SAILOR

7. The various types of entry of the sailors branch are as follows:-

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	I-Musicians	17-	Matric	March/Apr	Candidates should

Recruit)		21		il	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/ Apr for both entries.
	III- Cooks	17-21	Matric	Dec & June	
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

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	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**
MR (Outstanding Sportsman)	Steward/ Cook	17-21	Matric	Dec & June	

8. **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

CONCLUSION

9. 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?

LESSON PLAN N - 3

BRANCHES OF THE NAVY AND THEIR FUNCTION

Period - One

Type - Lecture

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction - 05 min

   (b) Executive Department -10 min

   (c) Engineering and Electrical -10 min

   (d) Logistics, Education and Medical Departments - 10 min

   (e) Misc Departments and Conclusion - 05 min

INTRODUCTION

1. Indian Navy has the following branches :-

   (a) Executive branch (d) Logistics branch

   (b) Engineering branch (e) Education branch

   (c) Electrical branch (f) Medical branch

EXECUTIVE DEPARTMENT

2. 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

ENGINEERING DEPARTMENT

3. 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).

ELECTRICAL DEPARTMENT

4. 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).

LOGISTICS DEPARTMENT

5. 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).

OTHER DEPARTMENTS

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.

LESSON PLAN N-4

ROLE OF NAVY IN INDO PAK WAR-1971 & KARGIL WAR

Period - One

Type - Lecture/Videos

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	- 05 min
	(b)	Naval Operations in Arabian Sea	-10 min
	(c)	Naval Operations in Bay of Bengal	-10 min
	(d)	Kargil War and Navy's role	- 10 min
	(e)	Conclusion	-5 min

INTRODUCTION

1. The Indo Pak War of 1971 was brought about by the flawed inner dynamics of the Pakistani system of governance where in the Bengalis of the East Pakistan were not dealt with according to democratic norms. Even when ballot gave them overwhelming majority, they were refused their rights by the Pakistani Government, that lead to Mujibur Rahman declaring Bangladesh an independent country on 25 Mar 1971.

NAVAL OPERATIONS IN ARABIAN SEA

2. The situation in the Arabian Sea was altogether different. The Submarine, surface and air threats were higher and assessment of threats were little confusing.

3. **Missile Boat Attack**. The first missile boat attack on Karachi, launched from Saurashtra (Okha) along the coast, was a success. It sank a Pakistani destroyer and a coastal minesweeper. The Indian Fleet planned its next attack for night 8/9 December. To divert attention from missile attack on Karachi, they had also planned a diversionary attack on Jiwani (Makran Coast). The bombardment group, under the Cruiser Mysore, apprehended Pakistani Merchant Ship 'Madhumati' south of Jiwani after she had transmitted an SOS to Karachi. After Madhumati was boarded Commander called off gun bombardment of Jiwani as SOS was good enough distraction for the missile boats to go through the attack on Karachi. Once again this second strike was also successful. A missile, set Karachi fuel storage tanks aflame and another hit Dhaka, the Pakistani Navy's tanker, at the anchorage. These two missile attack on Karachi achieved Western Fleet dominance of sea approaches to Karachi.

4. **Sinking of INS Khukri**. A submarine was reliably detected off Mumbai. On 8th December two frigates Khukri and Kirpan, were sailed from Mumbai to 'Flush' this submarine away from the Saurashtra coast where ships were assembling for the next missile attack on Karachi. On the evening of 9th December, the Pakistani submarine Hangor successfully torpedoed and sank Khukri. A sustained anti-submarine operation over the next four days was unable to prevent the Hangor's return to Karachi.

NAVAL OPERATIONS IN BAY OF BENGAL

5. In the Bay of Bengal there was no surface threat. At the very beginning of the war, the submarine threat vanished after Pakistani Submarine Ghazi was sunk at the entrance to Visakhapatnam Harbour whilst patrolling. There was no air threat after Indian Air Force attacks grounded aircraft in East Pakistan. Carrier borne Air Craft avoided attacking neutral Merchant Shipping at Sea. They concentrated on immobilising Pakistani vessels and damaged all Air Strips, which Pakistani Forces in East Pakistan could use to escape capture. Ships of Eastern Fleet enforced sea control and carried

out amphibious landing to cut off escape routes into Burma. Pakistan's Forces in the East laid down their arms after thirteen days of war and a new Nation Bangladesh came into being.

6. **Lesson Learnt**. The war ended on 17th December when Pakistan accepted India's offer of cease-fire. While Indian Navy gave a good account of itself, following lessons were learnt and post war action was taken to address these issues:-

(a) **Innovation and Exercise**. Missile boat attack carried out by Indian Navy by towing them near the vicinity of target was a plus point of improvisation.

(b) Submarine is a dangerous enemy in typical hydrological condition where it is difficult to detect and requires attack from air, surface and underwater –all three directions.

(c) Large calibre gun engagement between warships not likely. Anti ship missile would dominate future war at sea.

KARGIL WAR

7. **Introduction**. During 1999 Kargil War, the Western and Eastern Fleets were deployed in the Northern Arabian Sea, as part of the Operation Talwar. They safe guarded Indian Maritime assets from a Potential Pakistani Naval Attack as also deterred Pakistan from attempting to block India's sea-trade routes. The Indian Navy's aviators flew sorties and marine commandos fought alongside Indian Army personnel in the Himalayas.

8. **Initial Phase**. The 1999 Kargil War took place between May 8, when Pakistani forces and Kashmiri militants were detected atop the Kargil ridges and July 14 when both sides had essentially ceased their military operations. It is believed that the planning for the operation by Pakistan may have occurred about as early as the autumn of 1998. The spring and summer incursion of Pakistan-backed armed forces into territory on the Indian side of the Line Of Control (LOC) around Kargil in the state of Jammu and Kashmir and the Indian military campaign to repel the intrusion left 524 Indian soldiers dead and 1,363 wounded.

9. **Later Phase**. By 30 June 1999 Indian forces were prepared for a major high-altitude offensive against Pakistani posts along the border in the disputed Kashmir region. Over the previous six weeks India had moved five infantry divisions, five independent brigades and 44 battalions of paramilitary troops to Kashmir. The total Indian troop strength in the region had reached 730,000. The build-up included the deployment of around 60 frontline aircraft. The Pakistani effort to take Kargil occurred after the February 1999 Lahore summit between then Pakistani Prime Minister Nawaz Sharif and the Indian Prime Minister Atal Bahari Vajpayee. This conference was believed to have de-escalated the tensions that had existed since May 1998. The major motive behind the operation was to help in internationalizing the Kashmir issue, and for which global attention had been flagging for some time. The intrusion plan was the brainchild of Pakistan's Chief of Army Staff, Gen Pervez Musharraf and Lt Gen Mohammed Aziz, the Chief of General Staff. They obtained only an 'in principle' concurrence, without any specifics, from Nawaz Sharif, the Pakistani Prime Minister.

NAVAL ASPECTS OF KARGIL WAR

10. While the Army and the Air Force prepared themselves for the battle on the heights of Kargil, Indian Navy began to draw out its plans. Unlike the earlier wars with Pakistan, this time the bringing in of the Navy at the early stages of the conflict served to hasten the end of the conflict in India's favor.

11. **Strategy**. In drawing up its strategy, the Navy was clear that a reply to the Pakistani misadventure had to be two-pronged. While ensuring safety and security of Indian maritime assets from a possible surprise attack by Pakistan, the Indian imperative was that all efforts must be made to deter Pakistan from escalating the conflict into a high scale war. Thus, the Indian Navy was put on a high alert from May 20 onwards, a few days prior to the launch of the Indian retaliatory offensive. Naval and Coast Guard aircraft were put on a continuous surveillance and the units readied up for meeting any challenge at sea.

12. **Operation Talwar**. Time had now come to put pressure on Pakistan, to ensure that the right message went down to the masterminds in that country. Strike elements from the Eastern Fleet were sailed from Visakhapatnam on the East Coast to take part

in a major naval exercise called 'SUMMEREX' in the North Arabian Sea. This was envisaged as the largest ever amassing of naval ships in the region. The message had been driven home. Pakistan Navy, in a defensive mood, directed all its units to keep clear of Indian naval ships. As the exercise shifted closer to the Makaran Coast, Pakistan moved all its major combatants out of Karachi. It also shifted its focus to escorting its oil trade from the Gulf in anticipation of attacks by Indian ships.

13. As the retaliation from the Indian Army and the Air Force gathered momentum and a defeat to Pakistan seemed a close possibility, an outbreak of hostilities became imminent. Thus, the naval focus now shifted to the Gulf of Oman. Rapid reaction missile carrying units and ships from the fleet were deployed in the North Arabian Sea for carrying out missile firing, anti-submarine and electronic warfare exercises. The Navy also readied itself for implementing a blockade of the Pakistani ports, should the need arise. In addition, Naval amphibious forces from the Andaman group of islands were moved to the western sea-board.

CONCLUSION

14. In a skillful use of Naval power in the form of 'Operation Talwar', the Eastern Fleet joined the Western Naval Fleet and blocked the Arabian Sea routes of Pakistan. Apart from a deterrent, the former Prime Minister Nawaz Sharief later disclosed that Pakistan was left with just six days of fuel (POL) to sustain itself if a full-fledged war broke out.

Comprehension Questions.

Q1. Describe in 50 words role of Indian Navy in Indo Pak war of 1971.

Q2. What were the operations carried out by the IN in the Arabian Sea during Indo pak war of 1971?

Q3. Explain the Missile Attack on Karachi by the IN during 1971 Indo Pak war.

Q4. What operations were carried out by the IN in the bay of Bengal during 1971 Indo Pak war?

Q5. Describe in 175 words the naval aspects of Kargil war termed as Operation Talwar.

LESSON PLAN N -5

NAVAL CAMPAIGN (PEARL HARBOUR, FALKLAND WAR, BATTLE OF ATLANTIC/ FLEET PFR, IFR)

Period - One

Type - Lecture

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	- 03 min
	(b)	Pearl Harbour	-10 min
	(c)	Falklands War	-10 min
	(d)	Battle of Atlantic	- 10 min
	(e)	PFR, IFR and maritime shows	- 05 min
	(e)	Conclusion	- 02 min

INTRODUCTION

1. During First and Second World War, there were many Naval Campaigns which turned the tide of war and considered to be the turning points. Let us look at some of the famous naval battles.

PEARL HARBOUR

2. The Battle of Pearl Harbour was a surprise military strike conducted by the Imperial Japanese Navy against the United States naval base at Pearl Harbour, Hawaii, on the morning of December 7, 1941 (December 8 in Japan). The attack was intended as a preemptive action in order to keep the U.S. Pacific Fleet from interfering with military actions the Empire of Japan was planning in Southeast Asia against overseas territories of the United Kingdom, the Netherlands, and the United States.

3. The base was attacked by 353 Japanese fighters, bombers and torpedo planes in two waves, launched from six aircraft carriers. All eight U.S. Navy battleships were damaged, with four being sunk. Of these eight damaged, two were raised, and with four repaired, six battleships returned to service later in the war. The Japanese also sank or damaged three cruisers, three destroyers, an anti-aircraft training ship and one minelayer. 188 U.S. aircraft were destroyed; 2,402 Americans were killed and 1,282 wounded. Important base installations such as the power station, shipyard, maintenance, and fuel and torpedo storage facilities, as well as the submarine piers and headquarters building (also home of the intelligence section) were not attacked. Japanese losses were light: 29 aircraft and five midget submarines lost, and 65 servicemen killed or wounded. One Japanese sailor was captured.

4. The attack came as a profound shock to the American people and led directly to the American entry into World War II in both the Pacific and European theaters. The following day (December 8), the United States declared war on Japan. Domestic support for non-interventionism, which had been strong, disappeared. Clandestine support of Britain (for example the Neutrality Patrol) was replaced by active alliance. Subsequent operations by the U.S. prompted Germany and Italy to declare war on the U.S. on December 11, which was reciprocated by the US the same day. There were numerous historical precedents for unannounced military action by Japan. However, the lack of any formal warning, particularly while negotiations were still apparently ongoing,

led President Franklin D. Roosevelt to proclaim December 7, 1941, "a date which will live in infamy". Thus, Japan had achieved total “Surprise” by attacking Pearl Harbour. (Show Movie)

FALKLANDS WAR

5. The Falklands War (Spanish: *Guerra de las Malvinas* or *Guerra del Atlántico Sur*), also known as the Falklands Conflict or Falklands Crisis, was a 1982 war between Argentina and the United Kingdom. The conflict resulted from the long-standing dispute over the sovereignty of the Falkland Islands and South Georgia and the South Sandwich Islands, which lie in the South Atlantic, east of Argentina.

6. The Falklands War began on Friday 2 April 1982, when Argentine forces invaded and occupied the Falkland Islands and South Georgia. The British government dispatched a naval task force to engage the Argentine Navy and Air Force, and retake the islands by amphibious assault. The resulting conflict lasted 74 days and ended with the Argentine surrender on 14 June 1982, which returned the islands to British control. During the conflict, 649 Argentine military personnel, 255 British military personnel and 3 Falkland Islanders died.

7. The conflict was the result of a protracted historical confrontation regarding the sovereignty of the islands. Argentina has asserted that the Falkland Islands have been Argentinian territory since the 19th century and till to date and showed no sign of relinquishing the claim. The claim was added to the Argentine constitution after its reformation in 1994. As such, the Argentine government characterised their initial invasion as the re-occupation of their own territory, whilst the British government saw it as an invasion of a British dependent territory. However, neither state officially declared war and hostilities were almost exclusively limited to the territories under dispute and the local area of the South Atlantic.

8. The conflict had a strong impact in both countries. Patriotic sentiment ran high in Argentina, but the outcome prompted large protests against the ruling military government, which hastened its downfall. In the United Kingdom, Prime Minister Margaret Thatcher's government was bolstered by the successful outcome. Relations between the United Kingdom and Argentina were restored in 1989 following a

meeting in Madrid, at which the two Governments issued a joint statement. (Show Movie Clip)

BATTLE OF ATLANTIC

9. The Battle of the Atlantic was the longest continuous military campaign in World War II, running from 1939 to the defeat of Germany in 1945. At its core was the Allied naval blockade of Germany, announced the day after the declaration of war, and Germany's subsequent counter-blockade. It was at its height from mid-1940 through to the end of 1943. The Battle of the Atlantic pitted U-boats and other warships of the *Kriegsmarine* (German Navy) and aircraft of the *Luftwaffe* (German Air Force) against Allied merchant shipping. The convoys, coming mainly from North America and mainly going to the United Kingdom and the Soviet Union, were protected for the most part by the British and Canadian navies and air forces. These forces were aided by ships and aircraft of the United States from September 13, 1941. The Germans were joined by submarines of the Italian Royal Navy (*Regia Marina*) after their Axis ally Italy entered the war on June 10, 1940.

10. As an island nation, the United Kingdom was highly dependent on imported goods. Britain required more than a million tons of imported material per week in order to be able to survive and fight. In essence, the Battle of the Atlantic was atonnage war: The Allied struggle to supply Britain and the Axis attempt to stem the flow of merchant shipping which enabled Britain to keep fighting. From 1942 onwards, the Germans also sought to prevent the build-up of Allied supplies and equipment in the British Isles in preparation for the invasion of occupied Europe. The defeat of the U-boat threat was a pre-requisite for pushing back the Germans. Winston Churchill was later to state:

11. The Battle of the Atlantic was the dominating factor all through the war. Never for one moment could we forget that everything happening elsewhere, on land, at sea or in the air depended ultimately on its outcome. The outcome of the battle was a strategic victory for the Allies—the German blockade failed—but at great cost: 3,500 merchant ships and 175 warships were sunk for the loss of 783 U-boats.

12. The name ‘Battle of the Atlantic’ was coined by Winston Churchill in February 1941. It has been called the "longest, largest, and most complex" naval battle in history. The campaign began immediately after the European war began and lasted six

years. It involved thousands of ships in more than 100 convoy battles and perhaps 1,000 single-ship encounters, in a theatre covering thousands of square miles of ocean. The situation changed constantly, with one side or the other gaining advantage, as new weapons, tactics, counter-measures, and equipment were developed by both sides. The Allies gradually gained the upper hand, overcoming German surface raiders by the end of 1942 and defeating the U-boats by mid-1943, though losses to U-boats continued to war's end. (Show Slides)

MARITIME SHOWS,PFR,IFR

13. **President Fleet Review (PFR)**. The President of India is entitled to inspect his/her fleet, as he/she is the supreme commander of the Indian Armed Forces. The first President's Fleet Review by India was hosted by Dr. Rajendra Prasad on 10 October 1953. President's reviews usually take place once in the President's term. In all, ten Fleet Reviews have taken place, including in February 2006, when former President Dr. APJ Abdul Kalam took the review. The last PFR was held on 20 December 2011, when President Smt Pratibha Patil set sail in a warship INS Subhadra to take the 10th Fleet Review.

14. **Maritime Show**. The Presidents Review is an impressive ceremony, second only to the Republic Day Parade. Naval ships and ships from maritime organisations like the Coast Guard, the Merchant Navy, the National Institute of Oceanography, the Oil and Natural Gas Commission, Training Ship Rajendra and Naval Yard Craft are anchored precisely in neat lines and dressed overall. Thus, all stake holders in the maritime domain gather representing a total Maritime Show.

15. The President embarks in a naval ship nominated as the President Yacht, which files the President’s Colours. After receiving a 21-gun salute, the President reviews the Fleet by cruising past each line of Ships. Each ship’s side is manned by her ship’s company in white ceremonial uniform. As the President passes by, each Ships’ company, in unison take off their caps in salutation and give three resounding ‘Jais’. The fixed and rotary wings a/c squadrons also fly pass and carry out aerial aerobatics in the sky.

16. At sunset, all ships at the anchorage participate in a fireworks display. As darkness descends, all ships, in unison, switch on their garlands of lights, which accentuate their silhouettes.

17. No Fleet Review was held for President Neelam Sanjiva Reddy during his tenure from 25 Jul 1977 to 24 Jul 1982.

18. **International Fleet Review (IFR)**. The Indian Navy also conducted the first International fleet review named *Bridges of Friendship* in February 2001 in Mumbai. Many ships of friendly Navies from all around the world participated, including two from the U.S. Navy. The aim of IFR is to showcase India's Maritime assets and naval power in the international arena. The recent International fleet Review was held in Feb 2016 at Vishakhapattanam where President Shre Pranab Mukherjee reviewed the IFR.

CONCLUSION

19. Study of Naval Battles reveals that strategy and tactics have to be supported by logistics as the arena is vast. Navies have to be supported across oceans and for long periods of time. Also, real time communication is of extreme importance. Fleet is reviewed by the President, who is the supreme Commander of the Armed Forces, once in his/her tenure.

Comprehension Questions.

Q1. What is the significance of Pearl Harbour attack by Japan in World War II?

Q2. Enumerate the losses suffered by US Navy in the Pearl Harbour attack?

Q3. What is the significance of Falkland Islands for British and Argentina?

Q4. List the losses suffered by British and Argentina in the Falklands war.

Q5. Describe Battle of Atlantic.

Q6. What happens during the Presidents Fleet Review?

Q7. What is achieved through a International Fleet Review?

Q8. When was last IFR held in India?

CHAPTER-II

NAVAL WARFARE AND ITS COMPONENTS (NW)

LESSON PLAN N-1

ROLE OF AVIATION - NAVAL AIRCRAFT & HELICOPTERS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Role of Naval aviation	-10 min
	(c)	Various types of Aircraft	- 05 min
	(d)	Fixed wing	- 10 min
	(e)	Rotary & UAV	- 05 min
	(e)	Conclusion	- 05 min

INTRODUCTION

1. Indian Navy operates as a three dimensional navy with a responsibility to keep our maritime areas of interest safe and secure from underwater, surface and aerial threats. Naval aviation is one of the three dimensions responsible for keeping our national assets safe from air threat.

ROLE OF NAVAL AVIATION

2. Induction of air element in naval warfare has enhanced the reach of our forces to counter threat at longer ranges away from our coast. One of the primary role is to maintain surveillance at all times. Aerial surveillance is the fastest means with extended coverage which is achieved with LRMP aircraft. These aircraft can also carry out attack on surface, ships or submarines when detected. The fighter aircraft which operate from the aircraft carrier prevents strike by hostile aircraft on our surface ships or coastal assets. Helicopters embark on other ships of the fleet also support the fleet against submarines which are a threat to the fleet at sea and also enemy surface ships operating beyond the detection ranges of our ships.

TYPES OF AIRCRAFT

3. There are three types of aircraft in the navy:-

(a) **Fixed Wing Aircraft** Includes long and medium range maritime patrol aircraft, fighters and trainers.

(i) **LRMP** – IL 38 , and P8 I (a variant of P8A,US Navy). Their role include long range maritime reconnaissance, search and rescue, training, transportation, anti-submarine warfare (ASW), anti-surface warfare (ASUW), and shipping interdiction, along with an early warning self-protection (EWSP) ability etc,.

(ii) **MRMP** – Dornier. Its role include maritime reconnaissance, search and rescue, training, transportation etc.

(iii) **Fighters** MIG 29K. Their role include offensive combat, interdiction, recce, attack etc.

(iv) **Trainer** Kiran, AJT Hawk trainer Used for training the new pilots.

TU 142M

(b) **Rotary Wing Aircraft** Are helicopters based on surface ships. They include: -

(i) **Sea King & UH3H** Used for anti-ship, anti-surface and commando drop purposes.

(ii) **Kamov** Used for anti submarineand early warning and electronic surveillance.

(iii) **HAL Dhruv & Chetak** Used in anti submarine, search and rescue and VIP transport roles.

(c) **Unmanned aerial vehicle (UAV)** are pilotless aircraft fully controlled from a base and is used mainly for surveillance. They are: -

(i) Searcher

(ii) Heron

SEARCHER

CONCLUSION

4. The war at sea is complex and involves several units by way of ships, submarines and aircraft. Hence ships operating at sea have to be fully prepared to counter all these threats. One of the most effective resources is the presence of aircraft and helicopters at sea from ship based on the aircraft carrier and surface ships which can be launched at short notice and can cover extensive ranges over the sea to detect threats and also neutralize them.

Comprehension Questions.

Q1. What is the significance of Naval Aviation arm in the Indian Navy?

Q2. List out the different types of aircraft in the Indian Navy.

LESSON PLAN-N2

TYPES OF SUBMARINES AND ITS ROLE - ASW WEAPON AND SENSORS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Buoyancy and Floatation	-05 min
	(c)	Types of Submarines	- 05 min
	(d)	Role, Advantages & Disadvantages	- 10 min
	(e)	Weapons and Sensors	- 10 min
	(e)	Conclusion	- 05 min

INTRODUCTION

1. It was Leonardo Da Vinci who conceived the idea of a submersible. This was recorded in 1864 during the American civil war. Since then, the development of submarine as a weapon of war has been unique in the annals of Naval warfare. India has a large submarine fleet which can be deployed in offensive role to attack enemy warships and merchant shipping and to safeguard our assets.

BUOYANCY AND FLOATATION

2. A Submarine consists of a tubular hull, called a pressure hull. In order to float and stabilize this huge metal structure, the submarine is fitted with main ballast tanks. These are external to the pressure hull, and when on the surface are full of air to give the submarine a positive buoyancy. The tanks are opened to the sea at the bottom through small circular openings which result in flooding. To dive a submarine, the main vents are opened to allow air to escape and with it the sea water. (This essentially trims the submarines 'by the bow'.) This reduces the buoyancy, inducing neutral buoyancy causing the submarine to dive. Similarly if diving stations, are 'piped', a number of them moving aft from living quarters to the control room) water is pumped from aft to forward to maintain the trim.

TYPES OF SUBMARINE

3. There are two types of submarine these are:-

(a) **Conventional Submarines**. These are propelled by diesel engines or electric motors. The diesel engine is used to propel the submarine and charge its batteries, when the submarine is at the surface or on ***'snort'*** *(at periscope depth)*. The electric motor is used to propel the submarine when it is dived. The conventional submarine usually has a displacement between 5000 to 6000 tonnes. Their role include offensive patrol, maritime reconnaissance, intelligence gathering, sea control and sea denial, attack on enemy assets etc.

List of conventional submarines in active service include following: -

Ser	**Class of Submarine**	**Name of Submarine**
(i)	Sindhughosh	INS Sindhughosh INS Sindhudhvaj INS Sindhuraj INS Sindhuvir INS Sindhuratna INS Sindhukesari INS Sindhukirti INS Sindhuvijay INS Sindhurashtra
(ii)	Shishumar	INS Shishumar INS Shankush INS Shalki INS Shankul

(b) **Nuclear Submarines**: These are powered by nuclear reactors and therefore remain underwater for longer duration. They are also capable of higher speeds than conventional submarine. They usually carry strategic weapons like submarine launched ballistic missile (SLBM), with nuclear warheads. The nuclear submarine has much larger displacement than conventional Submarines. They can maintain submerged operating speed of 20 knots or more. Nuclear submarines presently in active service include following: -

Ser	**Class of Submarine**	**Name of Submarine**	**Remarks**
(i)	Arihant	INS Arihant	Ballistic Missile Submarine (SSBN)
(ii)	Chakra (Akula II)	INS Chakra	Attack Submarine (SSN)

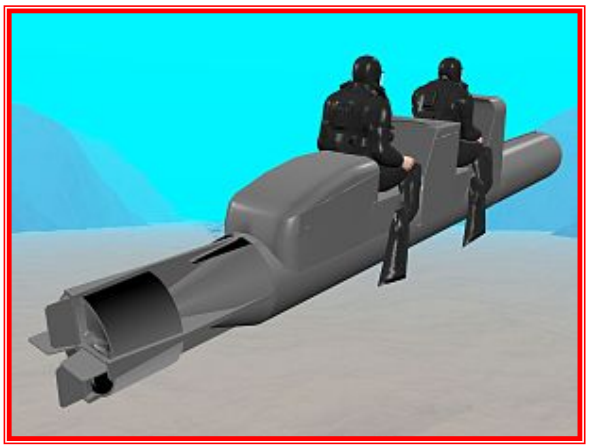
SPECIAL PURPOSE SUBMARINES

4. The special purpose type submarines are as follows:-

(a) **Coastal or Snort Submarine**. These Submarines have characteristics similar to those of the World War -II U-Boats but are of small size(usually 350 to 700 tonnes) and with limited endurance.

(b) **Midgets**. Midgets are very small submarines which carry a small crew of five or six men in a pressure hull. They have endurance at sea of 5 – 7 days. However, full operation efficiency is unlikely to be maintained for longer than 48 hours and submerged endurance is limited.

(c) **Pigmies or Chariots**. These are small crafts without a pressure hull, and are propelled by electric motors, and their batteries can be only recharged from ashore / a submarine tender ship.



ROLE, ADVANTAGES AND DISADVANTAGES

5. **Advantages of Submarine**

(a) **Conventional Submarine**.

(i) Conventional Submarines can operate in shallow water.

(ii) Are difficult to detect as they are small in size.

(iv) Economically cheaper.

(v) No radiation effect.

(b) **Nuclear Submarine**.

(i) It can remain dived for longer period.

(ii) More endurance.

(iii) More speed and accuracy.

6. **Disadvantages of Submarine**

(a) **Conventional Submarine**.

(i) Less Endurance.

(ii) Less Speed.

(iii) Has to surface for battery charging.

(iv) Can't carry nuclear weapon with war head.

(b) **Nuclear Submarine**.

(i) Higher noise radiation.

(ii) Expensive.

(iii) Cannot be used as small unit.

(iv) Cannot be deployed in shallow waters.

7. **Role of Submarines**.

(a) Deterrence to enemy shipping.

(b) Clandestine Operations in support of small units.

(c) Reconnaissance including photography of enemy ports and survey of beaches.

(d) Landing and recovery of agents and Saboteurs.

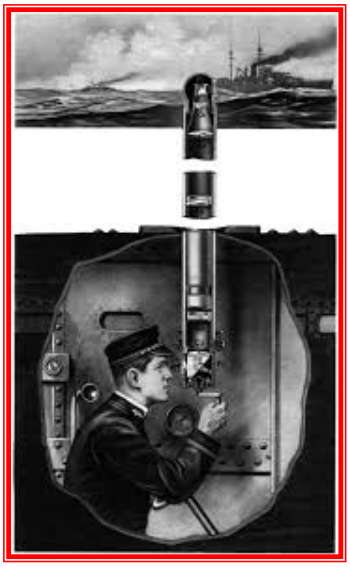
(e) Mine Laying.

(f) Launching strategic missiles.

SENSORS AND WEAPONS

8. The various sensors are as follows:-

(a) **Periscope**. Submarines are usually fitted with two periscopes. The larger one is used for reconnaissance and aerial search, and the smaller one for visual confirmation of a target, prior torpedo launch. The periscope is used for observation as well as for detection. If targets approximate bearing is known a check observation can be made in few seconds. A careful examination of the horizon takes considerable time and is usually conducted by sector searches. On a clear day, the submarine can sight a convoy at a range of 10 miles, escorting ships at about 7 miles, aircrafts at 8-9 miles.



PERISCOPE

(b) **Radar**. Most submarines are fitted with surface search and air search radar, one or both can be used when submerged at periscope depth. Some submarines have fire control radar antenna fitted to the search periscope. The range of detection by surface search radar is limited by its low height above the sea level.

(c) **Sonar**. Most submarines are fitted with an array type of sonar which provides a purely passive method of long range detection of noises of suitable intensity and frequency. Under ideal conditions the range may be greater than average value of 15 to 30 nautical miles.

(d) **Wireless/EW Equipment**. Submarines are fitted with suitable communication equipments for communication with surface ships and bases ashore. Submarines can receive VLF transmission on very low frequencies with their aerial 30 feet below the surface, even when operating as much as 3000 nautical miles of transmitting station.

(e) **Bathy Thermograph**. Submarines are provided with sound velocity recorder to asses estimated sonar range, shadow zones and best operating depths.

9. **Weapons of Submarines**.

(a) **Torpedoes**. Submarines have always been designed to carry a large number of torpedoes tubes. A tube assembly is accommodated in the submarines fore and aft ends. The tubes are arranged parallel to each other and discharged by ‘swim out’. The submarines may carry either passive/active/wire guided torpedoes. The following types of torpedoes are carried by submarines.

(i) Passive.

(ii) Active.

(iii) Wake homing torpedoes.

(iv) Wire Guided.

(b) **Missiles**. Some submarines are capable of firing tactical/cruise missiles. To permit launching without surfacing these missiles need to be of ballistic types. Some of the IN submarines have the capability of launching KLUB missiles.

(c) **Mine**. Submarines are capable of carrying and launching mines through the torpedo tubes. Since the torpedo being an important defensive weapon the submarines rarely proceed on operations with full load of mines at the expense of its torpedo carrying capacity. IN submarines are capable of laying MR 80, MRP, PBGM and PBEM mines.

10. **Sources to Detect Enemy Submarine at Sea**.

(a) Sonar.

(b) Radar.

(c) EW Interception.

(d) Aircraft.

(e) Visual Lookout.

(f) Visual sighting of Submarine or its periscope by merchant ships and fishing craft.

11. **Endurance of Submarine**. The endurance at Sea depends on several factors. Some of these are:-

(a) Fuel Carrying capacity.

(b) Distance from Base (Time on Patrol).

(c) Weather Conditions.

(d) Snorting Time.

(e) Time on Surface.

(f) Time out of Dock.

(g) Speeds Used (when submerged)

CONCLUSION

12. Submarines are very versatile platforms which use the principle of stealth to penetrate deep into enemy waters and carry out reconnaissance or offensive action against enemy shipping. They are fitted with weapons and sensors for detection and engagement. Conventional submarines are limited in their operations as they have to charge batteries whilst snorting and can be detected by ships or aircrafts.

Comprehension Questions.

Q1. List out the difference between a conventional and nuclear submarine?

Q2. Enumerate the various sensors onboard submarines.

Q3. What are the sources available to detect enemy submarines at sea?

Q4. List the factors that submarines depend for endurance at sea.

CHAPTER-III

NAVAL COMMUNICATION

LESSON PLAN -1

SEMAPHORE

Period - One

Type - Lecture/Pictures/Demonstration

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Semaphore, Alphabets & Signs	-10 min
	(c)	Prosigns	- 05 min
	(d)	Morse Code	- 10 min
	(e)	Practicals	- 05 min
	(e)	Conclusion	- 05 min

INTRODUCTION

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

SEMAPHORE

2. 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

ALPHABET AND SPECIAL SIGNS

3. 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)

PROSIGNS USED IN SEMAPHORE

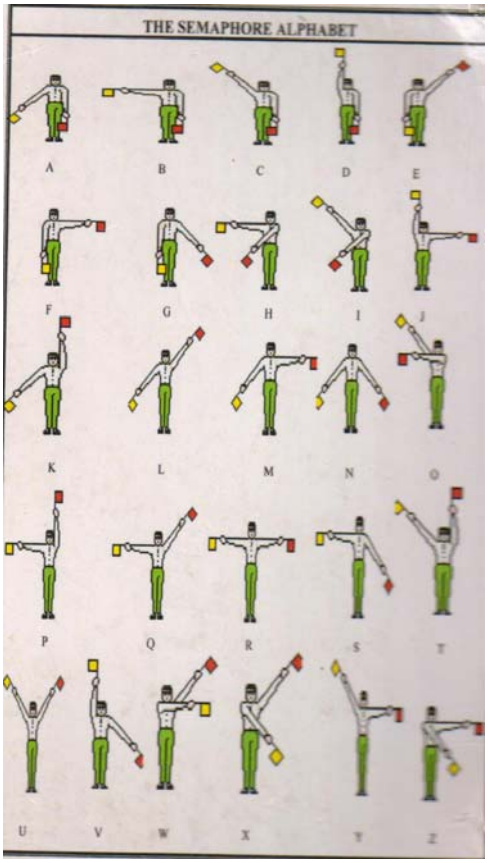
4. Prosign is a single letter or a combination of letters which are transmitted as a single character to convey a specific meaning. Some prosigns which are used in Semaphore and their use are given below:

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

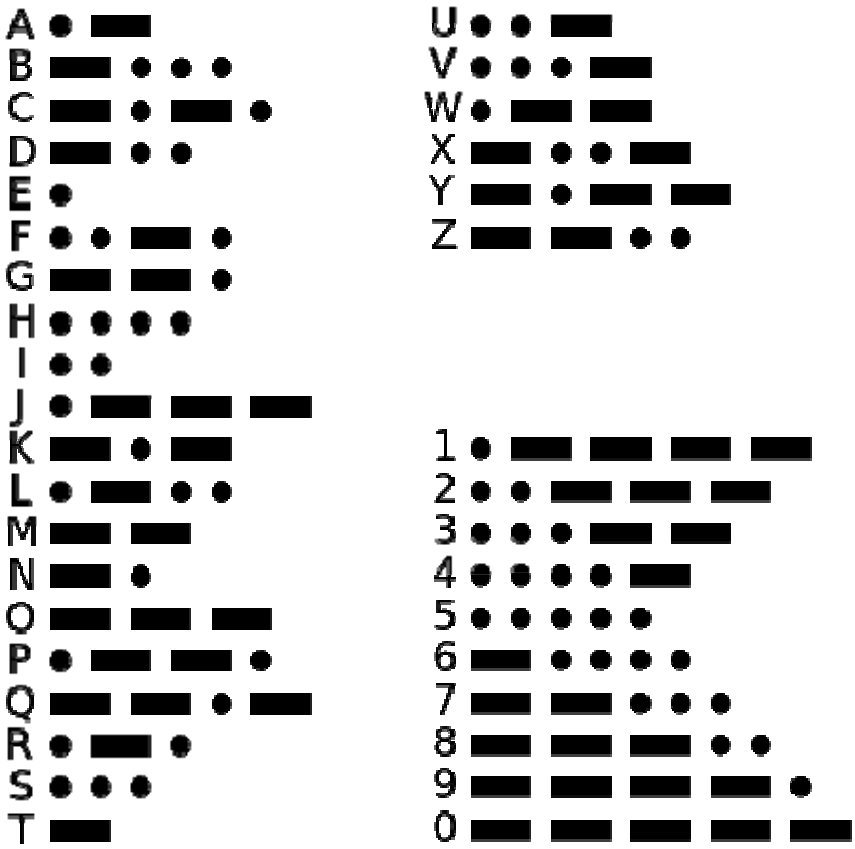


Semaphore Alphabets

6. **Morsecode**

International Morse Code

1. The length of a dot is one unit.
2. A dash is three units.
3. The space between parts of the same letter is one unit.
4. The space between letters is three units.
5. The space between words is seven units.



CONCLUSION

7. 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.

CHAPTER-IV

NAVIGATION

LESSON PLAN-N1

ELECTRONIC AIDS FOR NAVGATION

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -10 min

(b) RADAR -10 min

(c) RACON - 10 min

(d) Other AIDS - 10 min

(e) GPS - 05 min

(e) Conclusion - 05 min

INTRODUCTION

1. 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.

RADAR

2. 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.

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

RACON

4. 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.

OTHER AIDS

5. 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.

(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.

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

GPS

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 supposed 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.

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. Explain a radar and the different types used in the navy.

Q2. Describe in details the GPS and it's functioning.

LESSON PLAN-2

CLOUDS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -05 min

(b) Types of Clouds -15 min

(c) Conclusion - 05 min

INTRODUCTION

1. Clouds are formed due to the condensation of the water which evaporates from the various sources of water on the earth's surface. They are formed at very high altitude and descend over a period of time due to the density of the cloud and come down as rain.

TYPES OF CLOUDS

2. Types of clouds are as follows

(a) **High Clouds**. High-level clouds form above 20,000 feet (6,000 meters) and since the temperatures are so cold at such high elevations, these clouds are primarily composed of ice crystals. High-level clouds are typically thin and white in appearance, but can appear in a magnificent array of colours when the sun is low on the horizon.

(b) **Medium Clouds**. The bases of mid-level clouds typically appear between 6,500 to 20,000 feet (2,000 to 6,000 meters). Because of their lower altitudes, they are composed primarily of water droplets; however, they can also compose of ice crystals when temperatures are cold enough.

(c) **Low Clouds**. Low clouds are mostly composed of water droplets since their bases generally lie below 6,500 feet (2,000 meters). However, when temperatures are cold enough, these clouds may also contain ice particles and snow.

(d) **Clouds with Vertical Displacement**. Probably the most familiar of the classified clouds is the cumulus cloud. Generated most commonly through either thermal convection or frontal lifting, these clouds can grow to heights in excess of 39,000 feet (12,000 meters), releasing incredible amounts of energy through the condensation of water vapor within the cloud itself.

CONCLUSION

3. Clouds are categorised by their altitude and extent. Knowledge of clouds is essential to predict changes in weather. This affects various Naval operations like flying and Radar operations.

Comprehension Questions.

Q1. List and explain the various types of cloud?

SECTION- 3

INTRODUCTION TO ASTRONOMY

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -05 min

(b) Astro Navigation -15 min

(c) Conclusion - 05 min

INTRODUCTION

1. Astro navigation is the science of using celestial bodies, such as stars and planets, to navigate one's place on Earth. Historically used to navigate the oceans, and still considered a necessary skill for mariners, astro navigation has been replaced by GPS, radar systems and radio communications in recent times, making astro navigation seem somewhat obsolete. All Navies still include astronomical navigation questions on its mariner certification examinations, and many study the ancient art now for fun rather than necessity. Astro navigation is not easy. It involves mathematical formulas and committed study to produce results.

ASTRO-NAVIGATION

2. It is the science of using celestial bodies, such as stars and planets, to find one's position on Earth. Astronomical navigation has been replaced by GPS, radar systems and radio communications in recent times, making astronomical navigation seems somewhat obsolete.

3. **Sextant**. The sextant is a modern marvel when compared to other celestial navigation devices. It uses two mirrors so the instrument is aimed at the horizon, and the user only has to look in one place. The user would align the celestial body they were using with the horizon, by adjusting the sextant's moving parts. Various dials and notches on the device would then be used to determine the position of the user on the globe.

CONCLUSION

4. Although the navigator has a variety of electronic equipment at his disposal, the same are prone to failure or inaccuracies. Use of satellites maybe restricted during wartime or hostilities and the navigator may have to fall back on the most ancient and reliable method of position-finding, ie use of Astronomical bodies.

CHAPTER-V

SEAMANSHIP

LESSON PLAN L-1

BOATWORK- RIGGING OF SAILS IN BOATS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -05 min

   (b) Parts of Sails -10 min

   (c) Types of sails - 10 min

   (d) Conclusion - 05 min

INTRODUCTION

1. Whalers and Enterprise class boats are commonly used in the Navy as sailing boats. Enterprise class boats are meant only for sailing with a crew of two.

PART OF SAIL

2. The parts of sail are as follows

   (a) **Head** Upper side of lug sail

   (b) **Foo**t Lower side of any sail

   (c) **Luff** The forward edge of sail

(d) **Leach** The after edge of a sail

(e) **Peak** After upper corner of a lug sail

(f) **Tack** Lower fwd corner of a sail

(g) **Clew** Lower after corner of a sail

(h) **Throut** Forward upper corner of a sail

3. **Three types of sail**

(a) **Fore sail** The sail set immediately before the fore mast

(b) **Main sail** The sail set on the main mast

(c) **Mizzen sail** The sail set on the mizzen mast

CONCLUSION

4. . The sails have many parts which have typical terminology. Cadets are required to know the terms and understand the uses. Sailing requires both knowledge and skill.

Comprehension Questions.

Q1. List out the different parts of sail.

Q2. What are the three types of sail on a sail boat?

.

LESSON PLAN L- 2

BOATWORK- ELEMENTARY SAILING

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -05 min

(b) Terms used in Sailing -10 min

(c) Elementary sailing rules &Types of sails - 10 min

(d) Conclusion - 05 min

INTRODUCTION

1. Enterprise class boats are a very suitable platform for learning sailing. Cadets are required to know the terms and understand the uses. Sailing requires both knowledge and skill. A clear understanding of the orders is essential for sailing. Rules are to be understood and strictly adhered in races.

TERM USED IN SAILING

2. Following terms are used in sailing:-

(a) **Close-hauled**. A boat is close-hauled or sailing by, or the wind, when her sheets are hauled close aft and all her sails are drawing and she is sailing as close as possible to the direction from which the wind is blowing

(b) **Reaching**. A boat is reaching when she is sailing free with the wind abeam or before the beam.

(c) **Running**. A boat is running when she is sailing with the wind abaft the beam.

(d) **Sailing free**. A boat is sailing free whenever her sails are filled and she is not sailing close- hauled, i.e. When sailing so that she is free to manoeuvre on either side of her course without having to go about (see tacking)

(e) **Wearing/ gybing**. This is altering course away from the wind until the boat is on her new course or begins to gybe.

(f) **Beating**. When the destination of sailing boat lies directly upwind she beats to windward by sailing close-hauled in a series of alternate tacks

(g) **To luff**. This is altering course to bring the boat's head closer to the wind.

(h) **In irons**. A boat is in irons when she fails to go about from one tack to the other and lies head to wind unable to pay off on either tack

(i) **Port and Starboard tacks**. A boat is on the port tack when she is closed hauled with the wind on her port side, and on the starboard tack when she is close hauled with the wind on her starboard side.

ELEMENTARY SAILING RULES

3. Sailing rules are commonly known as "*rules of the road*".There are three common rules applicable to a sailing vessel:-

Rule 1 A sail boat running free must keep clear of one close hauled.

Rule 2 A sail boat close hauled on the port tack must keep clear of a sailboat close hauled on the starboard tack.

Rule 3 When both boats are running free on opposite tacks the vessel with the wind on the port side must keep clear.

Rule 4 When both boats are running free on the same tack the boat to windward must keep clear

CONCLUSION

4. Sailing requires both knowledge and skill. A clear understanding of the orders are essential for sailing. Rules are to be understood and strictly adhered in races.

LESSON PLAN-3

BOATWORK- POWER BOATS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction and Types of Boat -05 min

(b) Anchoring and securing a boat -10 min

(c) Towing a boat - 10 min

(d) Conclusion - 05 min

INTRODUCTION

1. 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

ANCHORING A BOAT

3. The imp points are as follows:-

(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

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

CONCLUSION

6. 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. Describe in 15 words how an anchor is prepared for letting go.

Q2. List parts of an anchor.

Q3. List parts of a cable.

Q4. What are the types of Anchor?

Q5. List types of Natural Fibre Ropes.

Q6. What is a manmade fibre rope?

Q7. How are steel ropes maintained?

Q8. Describe in brief what are Bend, Hitch and Knots.

Q9. List type of knots.

Q10. What are the elements of bend and hitches?

Q11. Which boats are used in the navy for sailing?

Q12. List parts of a sail.

Q13. What are the type of sails.

Q14. What is a close hauled situation/

Q15. What is gybing?

Q16. What are the ‘rules of road’ in sailing?

CHAPTER-VI

FIRE FIGHTING FLOODING

AND

DAMAGE CONTROL

LESSON PLAN N-1

FIRE FIGHTING, FLOODING AND DAMAGE CONTROL

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Types and classification of fire	-10 min
	(c)	Types of FF extinguishers/FF Triangle	- 10 min
	(d)	Principles of FF, Methods & Tactics	-10 min
	(e)	Search and Rescue & First Report	-10 min
	(f)	Basic FF rigs -photos/practical	-10 min
	(d)	Conclusion	- 05 min

INTRODUCTION

1. Fire can be caused due to various reasons. Prevention is the best way to fight fire. Early detection and knowledge of the types of fire and various methods to fight fire will enable containing the damage. Everyday Hazards of fire are as follows:-:

(a) Carelessness with naked lights and cigarettes left about.

(b) Paint and oil splashes in contact with heat.

(c) Cooking oil in the galley, if left unattended on the cooking range for a long time.

(d) Private electrical equipment not checked, safe and used without proper plugs.

(e) Smoking in unauthorized area and on bed.

(f) Electric iron and soldering iron not switched off or not in use and closed.

(g) Highly flammable materials not stowed safely.

(h) Keeping power supply 'ON' when compartment is not in use and closed.

TYPES AND CLASSIFICATION OF FIRE

2. **Types Of Fire**

Fire depends on three things being present together.

(a) Fuel or inflammable materials (Oil, paints, wood, paper etc.)

(b) Heat

(c) Oxygen

3. **Classification of fire.** There are five different types of fire. These are:-

Class		Type
A	-	General Fire
B	-	Oil Fire
C	-	Gaseous Fire
D	-	Metallic Fire
E	-	Electric Fire

TYPES OF FIRE FIGHTING EXTINGUISHERS USED IN NAVY

4. **Types Of Fire Fighting Extinguishers Used In Navy**. First Aid Fire Fighting Equipments:

(a) **9 Ltrs AFFF Extinguisher.**AFFF stands for 'Aqueous Film Forming Foam'. It is a new type of fire extinguisher which is painted bright red and is supplied to ship in lieu of water type and foam type extinguishers. It can extinguish both general and oil fire. It can also be used against electrical fires of normal ships voltage provided the nozzel is kept 1.8 metres away from the electrical fire and ships supply should be 440 V and below. Duration of the extinguisher is 60 to 90 seconds.

(b) **2 Kg CO2 Extinguisher**.This extinguisher is painted black and contains CO2 gas under pressure. It is operated by aiming the discharge horn at the base of the fire and removing the safety pin and opening the regulator. This extinguisher is used against electrical fire.

(c) **10 Kg Dry Chemical Powder Extinguisher**.It is used on metallic and oil fires. It consists of 10 kg dry chemical powder attached with a CO2 cartridge fitted inside with a cap. It is painted blue in colour.

(d) **PD 12 Dry Chemical Powder Extinguisher**.It is painted blue and is used on helo/flight deck of ship. It consists of 28 lbs dry chemical powder and is attached with CO2 cylinder, which is outside the extinguisher.

(e) **PD 25 Dry Powder type Extinguisher.**Dry chemical power extinguisher painted blue and is used on helo/flight deck of ship. It consists of 25 lbs dry chemical powder and a CO2 cartridge which is attached inside the extinguisher.

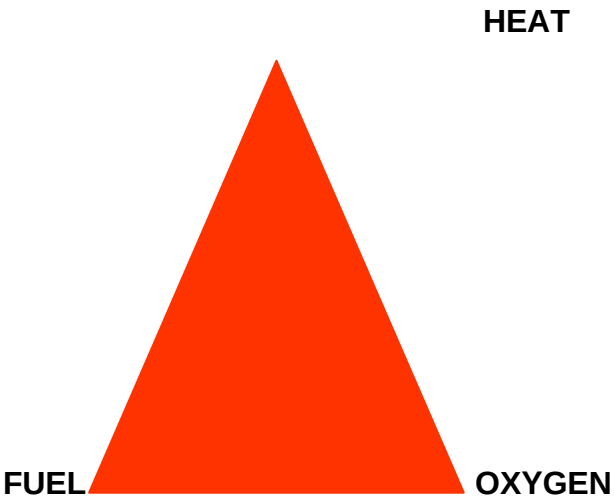
(f) **Trolley Mounted Fire Extinguisher**.

(i) 75 Kg dry chemical powder

(ii) Twin CO2 6.5 Kg

(iii) 45 ltrs foam.

5. **Fire Triangle**



PRICIPLES OF FF, METHODS AND TACTICS

6. **Principles of Fire Fighting**

(a) **Cooling**.This is done by bringing down the temperature or removing the heat. The best agent of cooling is water, which is freely available in ships for fighting the fire. Water must be applied to burning materials and not to the flames.

(b) **Starving**.It is to remove all inflammable materials in the vicinity of fire so that fire does not spread further and is automatically put off.

(c) **Smothering**. It is a process of cutting off air supply which helps fire. This isachieved by means of a first – aid fire fighting equipments, CO2 Smothering system, main foam appliances etc. This is also achieved by means of closing all port holes, hatches, ventilation fans etc.

7. **FF Methods & Tactics.**. On slightest suspicion of trapped personnel in a smoke filled section, search should be started immediately. The search team must:-

(a) Be well briefed.

(b) Have well defined search area.

SEARCH AND RESCUE/FIRST REPORT

8. **Search and Rescue**

Search party: - The minimum composition of 2+1 searchers must operate in pairs because

(a) A partner boosts morale

(b) In case of trouble, searchers can help each other.

(c) Better effort available for clearing obstructions.

(d) Easy transportation of causalities.

(e) Each of the searchers dons BA sets, and carry extension equipment and run guide line. At each flat, office, mess decks etc. One of the search team members must remain at entrance while the other makes his way into the space and feels his way around as close to the perimeter as possible (a casualty may crawl to a bulkhead and collapse there). The search must be made cautiously and thoroughly at the following locations:-:

(i) Fully at deck level.

(ii) Under tables, desks, chairs and benches.

(iii) Under bed clothes.

(iv) In cupboards, wardrobes and chests etc.

(v) Behind and beneath ladders.

(vi) Behind open doors behind fitted furniture, lockers etc.

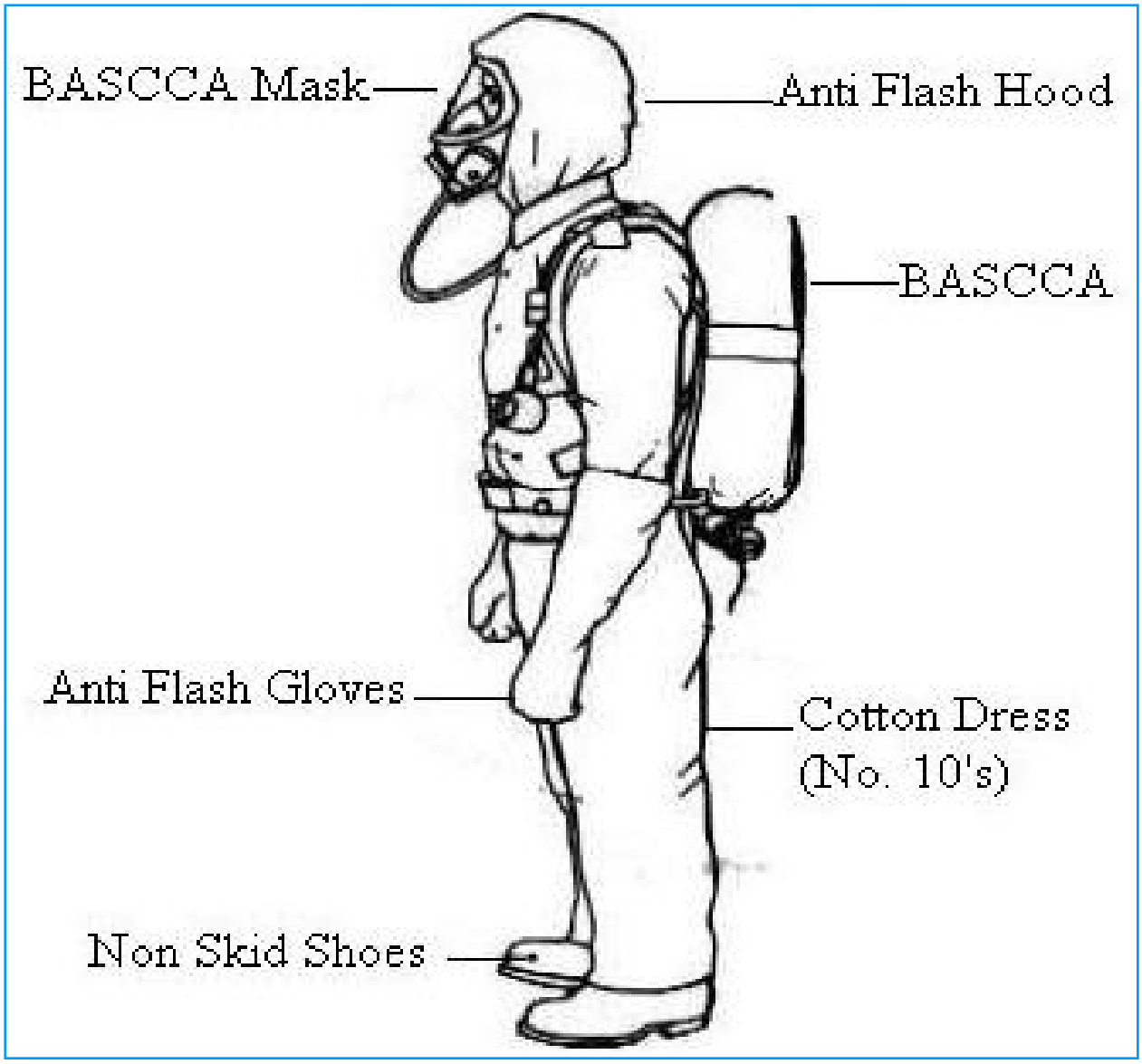
9. **First Report and Action**

(a) **If smoke is seen to be issuing from beneath a closed door**. Suspect fire but do not open the door, because, if the door is opened the fire might flare up fiercely and spread rapidly. Raise the alarm "fire fire fire" and inform the

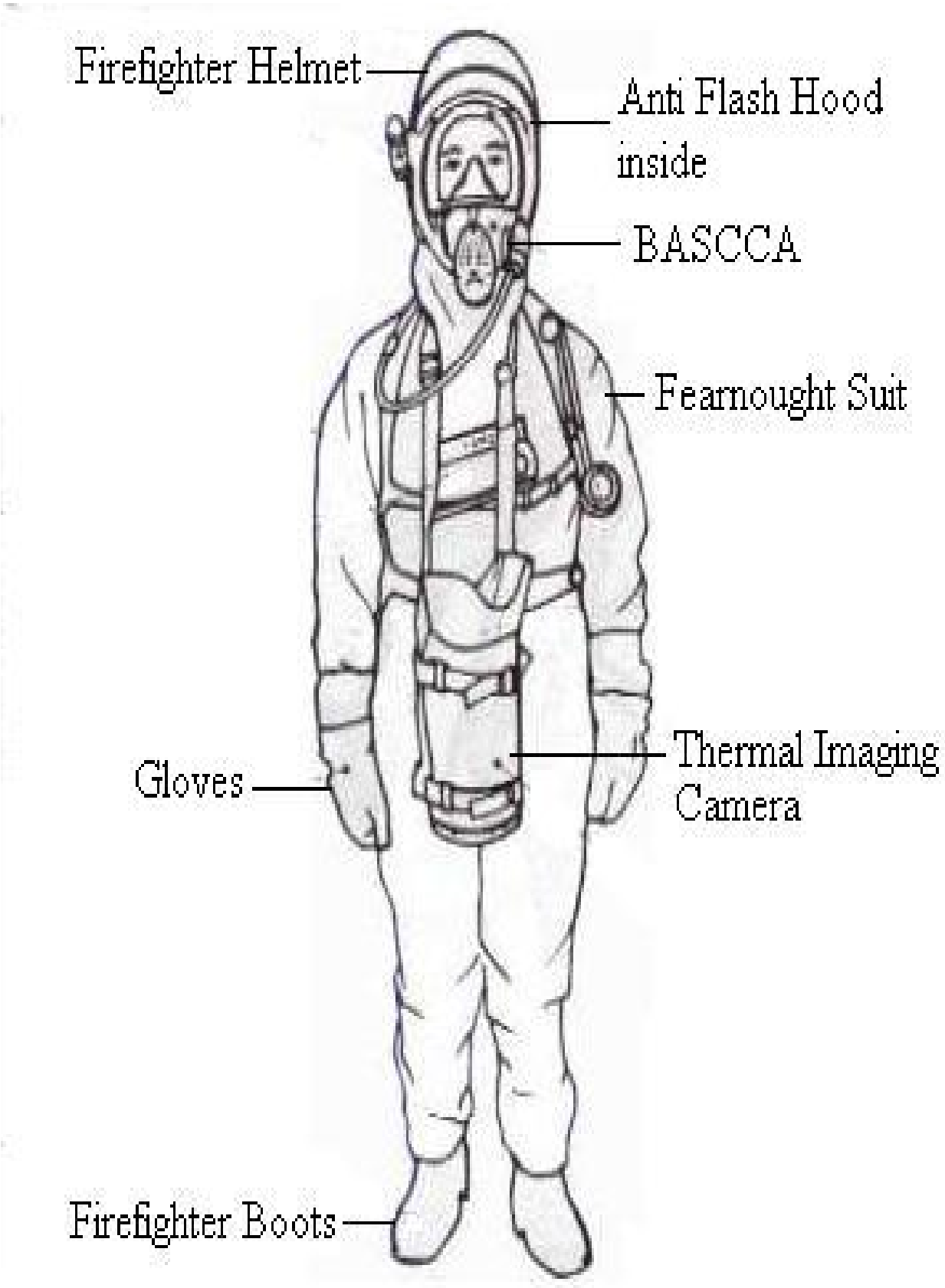
command by the quickest method. Pass clear and accurate message and return to the scene of the incident.

(b) **<u>If the door is open or the fire is not behind the door</u>**. If fire is discovered in an open compartment, raise the alarm by shouting "fire fire fire" and try to extinguish it with the equipment in hand. Inform command by quickest method. If the finder is doubtful of his ability to extinguish the fire, he should shut all openings to the compartment (if practicable), ensure command is informed and report to the person who arrives to take charge of the incident.

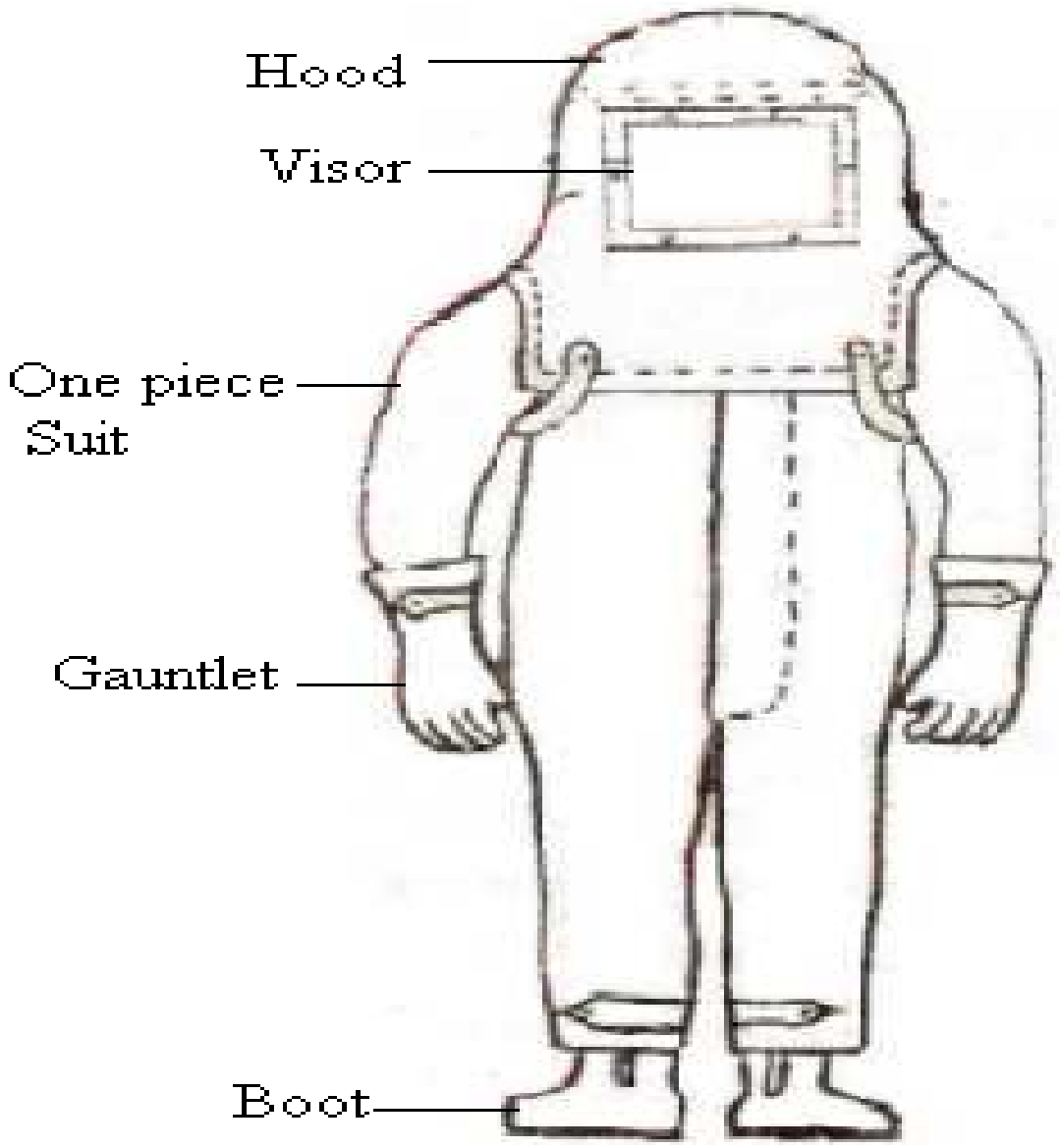
10. **<u>Basic Firefighting Rig with BASCCA set</u>**



13. **Full Firefighting Rig**



11. **ALUMINISED FIRE PROXIMITY SUIT**



CONCLUSION

12. Fire depends on three things being presenttogether. Firstly Fuel or inflammable material ,secondly Heat and thirdly Oxygen. Fire fighting is everybody's business and all personnel on board a ship should be alert to prevent and put out a fire.

CHAPTER-VII

SHIP AND BOAT MODELLING

LESSON PLAN L-1

CALCULATIONS OF SAIL AREA OF A MODEL

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2. (a) Introduction -05 min

(b) Calculation of sail Area for a Model -10 min

(c) Sail Plan - 10 min

(d) Practical Demo -15 min

(d) Conclusion - 05 min

INTRODUCTION

1. The Sailing Model's correctness is judged in competitions by racing them against each other. Thus, it is essential to calculate the sail area of the model.

CALCULATION OF SAIL AREA FOR A MODEL.

2. Although model yachts can be of different rigs, experience has proved that the most practical and efficient is the Bermuda rig. This is the simplest rig possible as it consists of a triangular (Bermudian or lego-mutton) main sail and single head salt (jib).

Hence all modern racing models without exception, rigged this way, it will facilitate the subject, if we use the proper and correct names/ terms for the different parts of the sail.

SAIL PLAN

3. If you refer to the sail plan, it will be seen that there are two triangular sails. The front one is the Jib, and after one the Main sail. Each sail has three sides- the luff (fore side) the leach (after side) and the foot. The top corner is the head, the front corner is the tack, and after corner the clew. This applies to both jib and main sail. Actual sail area is measured as follow:-

(a) **Main Sail**. The luff (forward side of sail) is measured from tack (bottom forward corner of sail) to underside of the head. The diagonal is a line taken from the clew (bottom after corner of sail) to the luff and perpendicular to it. The area of the sail is calculated by multiplying the luff by the diagonal and dividing by two (Figure VIII-1).

(b) **Jib**. The luff is measured from tack to underside of head to the eye in the head (top corner of sail). The diagonal is measured like in the main sail. The area of the jig is then calculated by multiplying the luff by the diagonal and dividing by two (figure VIII-i)

4. The measured area of the sail plan is the area of the main sail plus area of jib. There is no limit on the height of the rig in this class but the height of the jibstay above the deck must not exceed 80% of the height of the main sail head above deck. For example take a sail plan of 36” model yacht and measure it as under:-

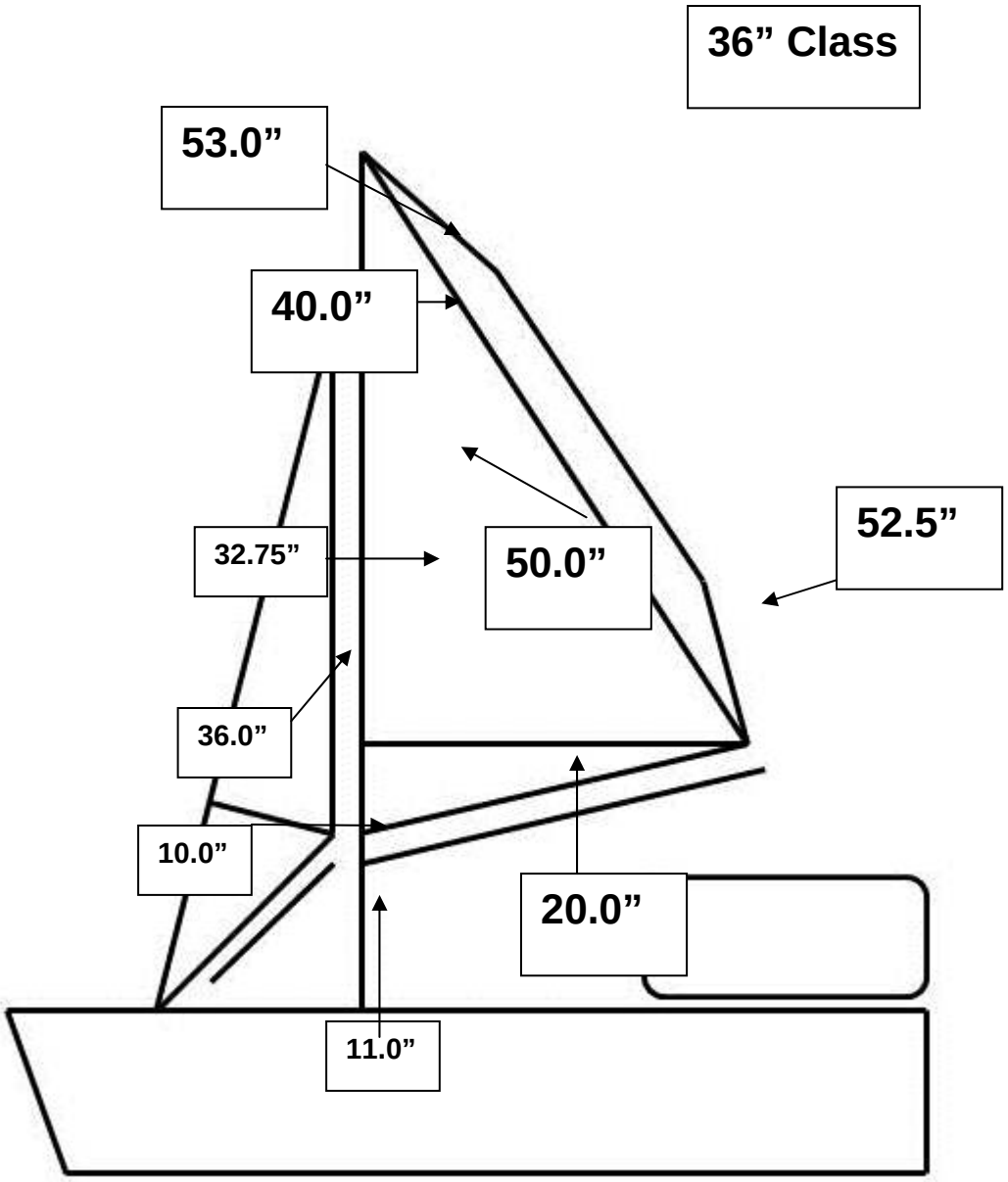
	Jib	**Main Sail**
Luff	36.0”	50.0”
Leach	32.75”	52.5”
Foot	10.00”	20.00”

Foreside Mast 12 5/8” bow.

Jib $\frac{36 \times 10}{2} = 180$

Main Sail $\frac{50 \times 20}{2} = 500$

680 Sq . Inches.



5. (Practical Demo with Sail is essential to impart this topic).

SECTION-2

REPAIRING OF SHIP MODELS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Stabilising	-10 min
	(c)	Fitting, Planting and Finishing Models	- 10 min
	(d)	Tools for ship Modelling	-15 min
	(d)	Conclusion	- 05 min

INTRODUCTION

1. Any type of model may be damaged, requiring repair. Also all working model are to be stabilised to give optimum performance.

2. **Repairing**. If a model is damaged while carrying from one place to another or to repair damaged model, stores required for repairs are:-

(a) Balsa wood Sheets, strips

(b) M Seal, Pins, feviquick

(c) Paints

STABILISING

3. 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.

4. A model's first contact with the water usually comes some time before the last cost of paint is dry and the last details is 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 to three coats of paint and if possible, before permanent attachment of the deck and superstructure.

5. 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 peace, then melt the lead in to a convenient block and place or screw, to the hull bottom as low as possible.

6. But for other types of hulls like planked hull or chine hulls, where the bulkheads are used for making watertight compartments and are glued with the keel, 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.

FITTING, PAINTING AND FINISHING MODELS

7. **Fitting of Models**. There are a large number of fitting on any ship/boat model. By far the best way is to study first hand a ship of the same type as the model or observe the details from photographs. The following are the main fittings generally found in a ship:-

Davits, Search Lights, Mast, Anchor, Fair Leads, Rigging Blocks, Cleats, Bollards, Stag Horns, Steering Wheel, Port Holes, Ventilators Capstan etc.

PAINTING AND FINISHING A MODEL

8. It is not enough merely to slap a coat of paint on the job, especially when so many hours have been put in to the earlier work. Although the temptation to get the model floating is very strong, an extra hour or two spent in a careful paint finish will more than repay in satisfaction during the models life.

9. The secret of good painting is good surface preparation alongwith the use of good tools and good quality materials. Thoroughness is essential, especially in painting the interior of the model .Small internal areas of the model which are unpainted can lead to water ingress which can lead to deterioration of the model.

10. Thus it is necessary to study the various phases of construction to decide what parts must be painted before the next step renders it inaccessible. The usual colour for the inside of a boat is white, though some builders prefer plain varnish or clear lacquer. In either case the first coat should be well thinned and applied freely, though not freely enough for it to run down and pool in the corners of the structure. After this coat, two full strength coats should be applied, allowing plenty of time for them to harden. A meticulous modeler will carefully rub down and finish at least those parts which will be visible when the model's hatches are removed.

11. It should always be determined beforehand which kind of paint is going to be used for painting the model. If nitro cellulose (NC) based lacquer is to be applied then obtain a smooth surface by using NC based primer surface only. If any gap is to be filled, it should be done only after applying a thin first coat of primer and that too with NC based putty. When the putty is well dried, it should be rubbed down with Carborandum Paper. The rubbing is to be done, using the kerosene oil because there is every possibility of the wood swelling it, water is used while rubbing. It must be remembered that with each coat of primer, rubbing is required.

12. If the painting is to be done by brush, a thin coat of lacquer is advisable every time to obtain good results. Further details of this will be given by the instructor in class.

TOOLS FOR SHIP MODELLING

13. **Tools for Ship Modeling**.

(a) Tap Hammer

(b) Nose Plier

(c) Cutting Plier

(d) L Square

(e) Junior Hacksaw

(f) Pin car

(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

CONCLUSION

14. A model has to be stabilized before it is put in water. The trim and heel are checked before as it forms an important part of the competition. Models have to be repaired regularly and cadets have to be conversant with the tools and procedures as

well as care and maintenance of tools and models. Models have to be packed carefully before transportation.

Comprehension Questions.

Q1. List the tools required for ship modelling.

LESSON PLAN N-3

HANDLING AND OPERATION OF REMOTE CONTROL MODELS

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-10 min
	(b)	Handling and Operation of a Remote Control Boat	-10 min
	(c)	Remote Control and Water Tank	- 10 min
	(d)	Conclusion	- 05 min

INTRODUCTION

1. **Introduction**. The models requiring control remotely need to maintain the basic principles of watertight integrity, stability and the right amount of buoyancy. The remote control models are generally made from strips of balsa wood or any other light weight wood which is easy to cut, bend and shape into. The model is generally made with wooden strips cut in such a way to maintain symmetry in design of the model. The strips form various strakes of the hull and full pieces of strips are used to cover the hull to form the decks. The design is more or less like that of an original ship with bulkheads and supporting structures being included to maintain the integrity of the model while keeping it watertight and balanced. The model is prepared in such a way that the motor is placed in the lower part of the hull and connected to the propeller through the aft part of the hull pierced and covered well to only allow the propeller to operate without any

ingress of water. The packing is done using steel bearings, rubber washers or oakum. The receiver for the motor is placed above the main deck for proper reception at all times and connected to the motor using small wire or PCB. The transmitter is used to operate the model in such a way as to rotate it 360° and move forward or back.

HANDLING AND OPERATION OF A REMOTE CONTROL MODEL

2. A model 40 to 50 cm length and minimum 6cm width is required for RC operation. While Operating the model, check that water leakage is not there. To operate the RC model the following items are required:-

(a) Remote Control

(b) Good Model as specified above

(c) Water Tank

REMOTE CONTROL

3. Remote Control has the following important items:-

(a) **Transmitter**. It operates the model in the ahead and astern direction and rotational direction of 360°. This will run with 12 V DC(8 Battery Cells of 1.5 V)

(b) **Receiver**. It is fitted in model to receive the orders from transmitter and works as ordered. Receivers runs with the help of 6V DC(4 Cells 1.5V)

(c) **Servers**. It operates with the help of receivers as per order passed by the transmitter and it will run as per the orders of receiver.

4. **Water Tank**. To operate RC model, a water tank of size 15'x 10'x 2'(15'long, 10'width and 2'height) is required. Tank will be filled with water up to one feet to operate the model with the help of remote control.

CONCLUSION

5. An RC model is performance oriented model when the finished model can carry out manoeuvres as required for the competition. Besides construction of RC model, with regards to its stability and water tightness, the cadets need to have hands on experience to operate the model using remote control in order to excel.

SECTION-4

PRACTICAL TRAINING

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PRACTICAL TRAINING TO BE IMPARTED BY THE SMI.

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CHAPTER-VIII

SEARCH AND RESCUE

LESSON PLAN L1

ROLE OF INDIAN COAST GUARD

Period - One

Type - Lecture/Pictures

Term - I (SD/SW)

Training Aids

1. Computer slides, Projector, Black Board, easel, chalk and duster.

Time Plan

2.	(a)	Introduction	-05 min
	(b)	Mission of Coast Guard	-10 min
	(c)	Role in Search and Rescue	- 10 min
	(d)	Conclusion	- 05 min

INTRODUCTION

1. In order to help the people affected and minimize said losses and the concept of Search & Rescue arises. SAR basically is an operation to locate those people who are in distress during the disasters or in imminent danger and provide them all the possible help and aid. Indian Coast Guard was established on 18 Aug 1978 and operates under the Department of Defence of the Union ministry of Defence. The Coast Guard works in close cooperation with the Indian Navy, Department of fisheries and Department of Revenue (customs) and the Central and State Police Forces.

COAST GUARD MISSION

2. Following are the mission of Coast Guard

(a) National Defence during hostilities and peace.

(b) Safety and protection of artificial lands, offshore terminals and other installations.

(c) Protection and assistance to fishermen and mariners at sea.

(d) Coastal security.

(e) Law Enforcement in territorial & international water..

(f) Preservation and protection of marine ecology.

(g) Ant smuggling and other customs & preventive operations.

(h) Scientific data collection and support.

ROLE OF INDIAN COAST GUARD IN SEARCH AND RESCUE

3. The Indian Coast Guard is responsible for coordinating SAR operation in the Indian Maritime Search & Rescue Region (IMSRR), The Indian SRR is sub divided into four sub region each with an assigned MRCC at Mumbai, Chennai, Port Blair and Porbandar. Coast Guard is basically an agency to provide SAR cover to ships and other crafts sailing in the sea l around Indian peninsula. Director General Coast Guard is the National Maritime SAR Coordinating Authority (NMSARCA). Under NMSARCA, the Indian Search and Rescue region of India is divided into three SAR areas with MRCC's located at Mumbai, Chennai and Portblair. The Indian Coast Guard is designated as a nodal agency for Maritime Search and Rescue in Indian Search and Rescue region.

4. **The various field which are covered by SAR operation of Indian Coast Guard include** help and aid to fisherman in a distress, medical help, Antipiracy operation, aids to ships during fire, flood, tsunami, pirate attacks, drowning, requirement of towing the vessel, communication failure, machinery breakdown, search of missing crew, boats, machinery and material, disembarking of rescued crew, help to vessels drifting, meet fuel starvation, help during sinking of crafts, boats etc, medical evacuation, providing international cooperation to foreign vessel, ships, prevention of oil spills, providing distress alerts to fisherman and local public etc.

CONCLUSION

5. The Indian Ocean region is of Strategic Importance for the Navy and it is very essential to provide SAR services in this region. A number of agencies are involved in the SAR cover. Coast Guard is basically an agency to provide SAR cover to ships and other crafts sailing in the sea around the Indian peninsula.

Comprehension Questions.

Q1. Explain the role of Coast Guard and how is it different from the Navy?

Q2. Explain in brief the role of the Coast Guard in SAR.

Q3. List the mission of the Coast Guard.