Senior Secondary Course

374 - Military Studies

Book 2

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A Word with You

Dear Learners

NIOS welcomes the learners to its course Military Studies which is for Senior Secondary Learners. The course is meant to develop the interest and deepen the understanding of learners in the field of Military Studies. Military Studies is very important to know about the need of Armed Forces and their role in the field of security.

This course has been divided in two parts and has 06 modules divided into 18 lessons. The modules are : **Military Studies, Structure and Role of the Forces, Security and Geo-Strategy, Indian Armed Forces : Weapons and War Equipment and Modernisation, Warfare and its Types, Armed Forces and its Role in Internal Security**

Each module deals with a separate concept and are interlinked with each other to maintain the continuity of the content. Five lessons out of 18 have been earmarked for Tutor Marked Assignment **(TMA).** These are **Lesson No.2** (Concept and Evolution of Military Studies)**, Lesson No. 5** (Special Forces), **Lesson No. 8** (Geo-politics), **Lesson No.13** (Biological Warfare) and **Lesson No. 14** (Chemical Warfare)**.** Remaining 13 lessons are meant for public examination. We hope that this course will attract the learners who have a keen interest in armed forces. The course is related to enhance the knowledge of working military personnel and prepare the young generation for army jobs.

Your feedback is always welcome.

For any kind of queries and suggestions feel free to contact us : www.nios.ac.in. We shall be happy to serve you.

Wish you all the best.

Chairman

NIOS

Military Studies Course
Overview of the Learning Material

Module	Lesson No.	Name of the Lesson	Mode of Assignment TMA/PE	
Module 1 : Military Studies	1	Importance of Military Studies		PE
	2	*Concept and Evolution of Military Studies*	TMA	
	3	Need of Military Studies Today		PE
Module 2 : Structure and Role of the Forces	4	Armed Forces		PE
	5	*Special Forces*	TMA	
	6	Paramilitary Forces		PE
Module 3 : Security and Geo-Strategy	7	Geo-Strategy		PE
	8	*Geo-politics*	TMA	
	9	Maritime Security		PE
Module 4 Indian Armed Forces : Weapons and War Equipment and Modernisation	10.	Role and Equipment used by the Armed Forces		PE
	11.	Modernisation of the Indian Armed Forces		PE
Module 5 Warfare and Its Types :	12.	Nuclear Warfare		PE
	13	*Biological Warfare*	TMA	
	14.	*Chemical Warfare*	TMA	
	15.	Cyber Warfare		PE
Module 6 Armed Forces and its Role in Internal Security	16.	Armed Forces in Peace Keeping		PE
	17	Armed Forces in Disaster Management		PE
	18.	Armed Forces in Internal Security		PE

Total Lesson : **18**
Lesson for Public Examination (PE) : **13**
Lesson for Tutor Marked Assignment (TMA) : **5**

Note : Content and images adapted from web-based resources in this SLM in being used for educational purposes only and not for commercial purposes.

How to use the Study Material

Congratulation! You have accepted the challenge to be a self-learner. NIOS is with you at every step and has developed the material with the help of a team of experts, keeping you in mind. A format supporting independent learning has been followed. If you follow the instructions given, then you will be able to get the best out of this material. The relevant icons used in the material will guide you. These icons have been explained below for your convenience.

Title: will give a clear indication of the contents within. Do read it.

Introduction: This will introduce you to the lesson linking it to the previous one.

Objectives: These are statements that explain what you are expected to learn from the lesson. The objectives will also help you to check what you have learnt after you have gone through the lesson. Do read them.

Notes: Each page carries empty space in the side margins, for you to write important points or make notes.

Intext Questions: Very short answer self check questions are asked after every section, the answers to which are given at the end of the lesson. These will help you to check your progress. Do solve them. Successful completion will allow you to decide whether to proceed further or go back and learn again.

What You Have Learnt: This is the summary of the main points of the lesson. It will help in recapitulation and revision. You are welcome to add your own points to it also.

Terminal Exercises: These are long and short questions that provide an opportunity to practice for a clear understanding of the whole topic.

Do You Know: This box provides additional information. The text in boxes is important and must be given attention. It is not meant for evaluation, but only to improve your general knowledge.

Answers : These will help you to know how correctly you have answered the questions.

Activities: Certain activities have been suggested for better understanding of the concept.

www **Web site:** These websites provide extended learning. Necessary information has been included in the content and you may refer to these for more information.

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ROLE AND EQUIPMENT USED BY THE ARMED FORCES

India boasts of having the second largest Army in the world - an Army battle hardened on all possible types of terrain from the icy heights of the Siachen Glacier to the deserts of Rajasthan and from the plains of Punjab to the forests of the North East. India, due to unresolved border disputes and hostile neighbours, is required to maintain a well-equipped armed force at all times.

The army is required to be prepared for external threats as well as internal disturbances. India faces challenges from the threat of militancy in the North Eastern parts and state sponsored terrorism in Jammu and Kashmir. Indian army is constantly modernising by inducting new weapons & technology to face all threats. India today is the world's largest importer of military hardware.

In this module, we shall learn about the major weapons and equipment that are presently in service in the Armed Forces of our country. For ease of understanding the details of weapons and equipment are outlined as per the role and tasks of the various combat arms of the Army, Navy and Air Force.

Objectives

After studying this lesson, you will be able to:

- explain the role and function of Infantry, Armoured Corps, Mechnised Infantry, Artillery, Engineers, Army Air Defence, Army Aviation Corps, Signals;

- describe the different kind of Naval ships and

- explain the Indian Air Force, its role and equipment.

10.1 Infantry

Over the centuries it has always been the foot soldiers who have led and captured

Module - IV

Indian Armed Forces : Weapons and War Equipment and Modernisation

Note

land in enemy territory. They also man our borders and have defended the territorial boundaries from invaders. History is replete with the valiant saga of scores of men who have defied odds to win battles for their armies.

Infantry is the major arm of the Indian Army. It is an arm of close combat with the task of closing in with the enemy to physically assault and capture ground. It is also required to prevent aggression within. The infantry is heavily committed in undertaking Counter Insurgency and Counter Terrorist Operations. To perform the assigned tasks, the infantry should be equipped with the under mentioned weapons and equipment.

Infantry's Weapons and Equipment

Assault Rifle, Sten Machine Carbine, 9mm Pistol and Hand Grenades are the personal weapons for individual soldiers. All soldiers and officers carry one of these weapons along with hand grenades when they go to war. You can identify them from the illustrations given.

5.56mm INSAS RifleFixed Butt AK- 47 Rifle

Fig 10.1- Assault Rifles

Fig 10.2 - 9mm Sten Machine Carbine

Fig 10.3 - 9mm Pistol

Source : common.wikimedia.org

Fig 10.4 - Hand Grenades Source : pixbay.com

5.56mm Light Machine Gun: It can fire effectively up to 700m. It is an automatic gun and has a higher rate of fire than an assault rifle. It is useful in breaking the enemy forming up for final charge on own defences.

Fig 10.5 - INSAS Light Machine Guns

Rifle AK 203: It is a new assault rifle which is in the process of being introduced into the army. It will replace the INSAS weapon system and is manufactured as a joint venture between Russia and The Ordnance Factory Board, in Korwa, Amethi, Uttar Pradesh.

Fig 10.6 Kalashnikov AK 203 Assault Rifle

84 mm Rocket Launcher: This is used to destroy tanks, bunkers, vehicles etc. It can be used to illuminate the battle area as also for making smoke screens to hide movement of own troops.

Fig 10.7 - 84mm Rocket Launcher

51mm Mortar: This is used to fire high explosive bombs on enemy. It is an area weapon use which can destroy the enemy. It can also fire illumination and smoke bombs.

Fig 10.8- 51mm Mortar

7.62mm Medium Machine Gun: It can fire 600 to 1000 rounds per minute at an effective distance of 1800m. The 30mm Automatic Grenade Launcher is best suited to engage enemies in the open. It has an ammunition box that can hold 30 grenades. It can fire up to 2300m.

Fig.. 10.9 - 7.62mm Medium Machine   *Fig 10.10- Gun 30mm Automatic Grenade Launcher*

7.62mm Dragunov Sniper Rifle: It has an effective range of 800m and is widely used by sharp shooters and marksmen to eliminate individual enemy targets. It is very effectively used on the Line of Control at our borders in Jammu and Kashmir.

Fig - 10.11 -   7.62mm Dragunov Sniper Rifle

40mm Multi Grenade Launcher: It is capable of firing grenades up to 375m. It is very effective in urban areas and jungle terrain.

Fig - 10.12 - 40mm Multi Grenade Launcher

81 mm Mortars: It is an area weapon which can fire high explosives, smoke and illuminating bombs. Its effective range is 5000m (or 5 KM). It can fire in all types of terrain and in all weather conditions.

Fig - 10.13- 81 mm Mortars

Anti Tank Guided Missiles (ATGM): With a range of upto four kms, the ATGMs are very accurate and effective in destroying tanks in war.

Fig - 10.14 - [ATGM] Anti Tank Guided Missiles

Hand Held Thermal Imager (HHTI) and Battle Field Surveillance Radars (BFSR) The HHTI is used to detect enemy troops at 1.5 kms and vehicles up to 3 kms. It is very effective being used on the Line of Control where it is used for detecting terrorists and enemy troop intrusions. The BFSR can be used for detecting enemy movement for a distance upto 18 kms.

Activity 10.1

i)   Watch the gutsy queen of battle 'the infantry' in action.
https:// www.youtube.com/watch?v=Lnco_ZOUrvo

ii)   Watch the video to understand the personal weapons carried by the infantry soldier.

https://www.youtube.com/watch?v=Cf_G4Yot2tg

10.1.1 Armoured Corps

In ancient times as well as till the later part of the medieval period, a sizeable number of troops of major armies used to fight on horses as part of the Cavalry force. The Cavalry, while it gave speed and manoeuvrability to the troops, also exposed them to the dangers of enemy cannons and other weapons against whom they had little personal protection.

The tanks, which they now use, were introduced to cater to an arm of soldiers who could fire on well entrenched enemies and give them the shock effect before the infantryman charged with his bayonet. In modern times these armoured tanks have replaced the horses. The armoured tanks are capable of heavy fire power, quicker mobility and manoeuvrability. They are employed to destroy enemy tanks, blow up bunkers and churn the target area by over running the objective.

They give close support to the infantry which normally follows behind the tanks in the last few hundred meters before the final assault on the objective. Armoured tanks, though being quick and offensive, cannot hold ground like the infantry. Night vision capabilities have made the tanks more versatile and lethal. The Armoured tanks in battle are a great source of fear for the opponents.

It is documented in our history how the introduction of tanks at the Zoji la Pass in the 1948 war changed the course of the battle and gave victory to the Indian Army.

Let us look at the various types of Armoured vehicles in service with the Indian Army.

- **T-72 and T-90 Tanks :** Both these tanks are of Russian origin. The T-72 was the most popular tank after World War II. It was being used by over 40 countries worldwide. The T- 90 tanks are the upgraded versions of T-72 with greater mobility, fire power and lethality.

- **Main Battle Tank (MBT) Arjun :** It is an indigenously built tank with advanced features like automatic target locating, tracking and destruction. It has superior armour protection than the Russian T-90s.

- **Bridge Laying Tank :** As the name suggests, it is used to lay bridges over obstacle ridden terrain to enable tanks, troops and logistical transport to cross over. The indigenously made 20-meter long 'Kartik' bridge laying tank is one of the widest tank bridges in the world. The bridge can carry all types of tanks and other vehicles in service with the Indian Army, including the Arjun MBT.

ACTIVITY 10.2

i) Collect pictures of all the different types of tanks discussed in this section and paste in your notebook.

ii) Look up the internet link given below and read about the Role of tanks in Battle.

https://www.youtube.com/watch?v=kwvFlzNjYjU

iii) Use the link given below to watch the movie on the Battle at Zoji la Pass during 1948 Indo - Pak War. You will get an idea of what it takes to move the tanks at high altitude and fight.

https://www.youtube.com/watch?v=ns5ac5iwuZQ

10.1.2 Mechanised Infantry

Over the decades a need was felt to carry the infantry along with tanks which could give the offensive forces speed and fire power while keeping the soldiers safe and fresh to fight. The Mechanised Infantry is a combat arm that has the capability to carry soldiers on armoured vehicles called Infantry Fighting Vehicles (IFV) or Armoured Personnel Carriers (APC) to transport infantry directly into battle. They follow tanks and dismount the troops who then fight as infantry as and when required.

Their role is to close in with the enemy by manoeuvre, to destroy / capture the enemy, repel the enemy attack by fire, engage in close combat or counter attack. The troops move in vehicles called BMPs which provide quick mobility to assaulting troops rapidly through small arms and indirect fire to deliver the infantry up to the objective and there after continue to provide fire support from a flank. Currently, Russian made BMP-2 are in service in Mechanised Infantry. IFV can also float in water and cross water obstacles. It can carry ten personnel including the crew.

ACTIVITY 10.3

Watch Mechanised Infantry in Action and note down important points about it.
https://www.youtube.com/watch?v=c1Uqbfh7n_E-

Intext Questions 10.1

1.   What is the number of soldiers a BMP can carry?

2.   Write a short note on 'Main Battle Tank (MBT)'.

3.   Write the full forms of ATGM, HHTI, BFSR.

10.1.3 Artillery

To unsettle the well- entrenched enemy and cause destruction to soften the target before the actual assault by instantly, there is a requirement of carrying out heavy bombardment. It is called preparatory bombardment. Some portion of this preparatory bombardment is done by the Air Force. The majority of it is left to the Artillery.

The role of Artillery is to severely deplete the enemy's will to fight through heavy bombardment. Artillery also fires at the enemy's concentration areas, logistic hubs and forward localities. They provide fire cover to infantry and armoured troops by softening enemy's resistance. They keep the enemy's head down and assist our troops in launching assaults with minimum casualty. In 'Operation Vijay' artillery played a stellar role in pulverising enemy's defences and causing heavy casualties. The Indian artillery fire was so intense that the snow and ice on the mountain top turned yellow.

- Main artillery guns 120 mm Mortars, 105mm Indian Field Gun, 155mm Bofors Gun, 130mm Field Arty Gun, 155mm Made in India 'Dhanush' are used by the Indian Army.

ACTIVITY 10.4

Collect pictures of the guns mentioned above and paste in your notebook.

- **Weapon Locating Radars (WLR):** These radars are used to locate enemy artillery guns and mortars,when they fire at us. By getting their exact location our own artillery then fires at enemy artillery and destroys it. This tactics is called "counter bombardment".

- **Unmanned Aerial Vehicle (UAV):** These are employed to look into enemy territory and collect intelligence. Israeli made Heron Mark II are extensively used to carry out recce of enemy area as also in locating terrorist movements in Jammu and Kashmir.

- **Long Range Recce and Observation System (LORROS):** It is used to locate and identify enemy troop and vehicle movement in war and for counter terrorist surveillance in Jammu and Kashmir. It is an optical device like a telescope.

ACTIVITY 10.5

Watch a Short movie on Artillery and answer these questions:
https://www.youtube.com/watch?v=kbxVnEDKSZw

(i)   What is the range of the 155 mm BOFORS FH77 Gun?

(ii)   What is the approximate cost of Precision Guided Munitions?

10.1.4 Engineers

Indian army is a modern army which is self- sufficient in fighting wars on all its terrains of mountains, plains, jungles, deserts and glaciers. The combat arms like the Infantry and Armoured critically need the support of the combat support arms to win wars. While the combat arms lead the assault into battle, the combat support arms ensure victory through fire power, logistics and technical assistance.

The foremost among the combat support arms are the Engineers. Engineers role is to ensure mobility, counter mobility and ensure survivability during war. They are tasked for laying tracks, helipads, airstrips, bridges, water sources, laying and breaching mines and construction of field defences. They also create obstacles in the path of the enemy by demolishing bridges to delay and cut off the logistic chain to the assaulting troops.

Major Engineer Equipments and Bridges are AM-50, PMS, Bridge Laying Tank,

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Note

Girder Bridge, Bailey Bridge and Pontoon Bridge.

ACTIVITY 10.6

Watch Army Engineers in action.

https://www.youtube.com/watch?v=oiHKMGo-7qs

10.1.5 Army Air Defence (AAD)

During war the enemy's intention is to destroy all our vital installations by aerial bombing. The aircraft with speeds faster than what the human eye can detect require sophisticated equipment and counter measures to nullify the evil designs of the enemy. The AAD is tasked to protect vital static installations like nuclear plants, air bases, radar sites etc from enemy air threat. They are also responsible for protection of Indian air space from enemy aircraft and missiles.

Resources available with AAD are Shilka, L-70 Gun , Kwadrat, Strella, IGLA Missiles, ZU- 23mm Guns, Tangushka and OSAAK -Surface to Air Missiles

ACTIVITY 10.7

Watch the military hardware of the Army Air Defence - https://www.youtube.com/watch?v=wkGH5cYdH9k

10.1.6 Army Aviation Corp

The combat arms at times of war and peace need assistance for recce of inhospitable or unknown terrain, casualty evacuation and ferrying of supplies to air maintained locations that need stocking of supplies especially during winters when all road communications gets closed owing to heavy snowfall. It is in such critical situations that the Army Aviation Corps charts its role to support the ground troops.

The versatile Army Aviation Corps operates in all kinds of terrain be it the deserts, plains, forest and high mountains to the bone chilling Siachin glacier. Its missions are mainly dedicated to casualty evacuation, ferrying of soldiers and supplies, recce and search and destroy operations.

The main helicopters with the aviation corps are Dhruv and Cheetah

ACTIVITY 10.8

Watch Army Aviation corps in action- https://www.youtube.com/watch?v=G4x-b9wz9u4

10.1.7 Signals

The troops during war require secure communication to pass and receive sensitive information. These are then used by commanders at all levels to plan and execute the various stages of war. The corps of signals is the backbone of the Army's communication setup. They handle military communications, operate and maintain Army Wide Area Network (AWAN) which is the Army owned internet. They protect against cyber threats from anti national elements.

They also carry out electronic warfare using technology and equipment developed by Defence Research and Development Organisation (DRDO). Basically their role is to ensure communication which enables commanders to gain information from the forward locations in war, issue instructions and orders lower to commanders and forward troops. Progress of the battle is also relayed to the higher commanders.

ACTIVITY 10.9

Watch the Corps of Signals in action.

https://www.youtube.com/watch?v=vgllbD71F3U

Intext Questions 10.2

1. What is the role of Infantry ?

2. Highligt the mission of Army Aviation Corps.

3. Explain the role of Artillery.

10.2 Ships and Their Weapon System in the Indian Navy

The history of the naval might of India dates back to the Chola empire of South India who were at the height of their glory from the 10th to the 12th century AD. Today the major role of the Navy involves conduct of active operations during war and to undertake humanitarian assistance and disaster relief missions during peace. India has a coastline of 7516 Kilometres.

The Indian Navy safeguards and ensures security of the sea lanes of communication thus supports the trade [95% of total trade] that is transported by sea. They keep our seas and oceans safe from pirates.

Navy is effectively used to transport troops, five power & logistics to deal with situations in neighbouring countries as was done in Maldives in 1988.

The different kinds of Naval Ships are highlighted as under :

Aircraft Carriers : India has one Fleet Carrier (INS Vikramaditya - and one Light

Carrier (INS Viraat). An aircraft carrier is basically an airbase. In other words, it has warplanes on board that can take off and land while the ship is in water. INS Vikramaditya was bought from Russia and refitted. It can carry upto 34 Fixed Wing Aircrafts and Helicopters. The MIG 29K is the main fighter aircraft on board. With over 1,600 personnel on board, Vikramaditya is literally a 'Floating City'. Associated with this large population is a mammoth logistics requirement. The ship requires nearly a lakh of eggs, 20,000 litres of milk and 16 tonnes of rice per month to feed the crew. With her complete stock of provisions, she is capable of sustaining herself at sea for a period of about 45 days.

ACTIVITY 10.10

See INS Vikramaditya in action.

https://www.youtube.com/watch?v=EGhhwgQtuUg

- **Attack Submarines :** An attack submarine is a submarine that can sail under water and attack and sink other submarines, surface ships and merchant vessels. They could be deployed in groups/alone or assigned to protect other ships (like aircraft carriers). India has 15 attack submarines out of which 14 are conventional and one is a Nuclear submarine. A nuclear submarine has a nuclear power plant. All naval vessels use diesel engines for propulsion. A nuclear submarine uses nuclear energy for propulsion.

- **Destroyer :** A destroyer, as the name suggests, is a fast and versatile long-endurance warship. They are employed to escort bigger ships (like Aircraft Carriers) and engage in anti-submarine, anti-aircraft and anti-surface warfare. India has 10 destroyers. The Israeli Barak missiles and the indigenous naval version of Brahmos missiles are deployed on destroyers. INS Kochi is a destroyer class ship.

- **Frigate :** A Frigate is a warship that are smaller than destroyers and are employed to protect other warships and merchant marine ships. It can also be used in anti-submarine, anti-aircraft and anti-surface roles. India has 15 Frigates.

- **Corvette :** Corvettes are swift, manoeuvrable, lightly armed warship. They are smaller than a Frigate. They are usually considered the smallest vessel to be called a proper warship. India has 22 Corvettes.

- **Patrol Vessel :** Patrol Vessels are employed for border protection roles, including anti-smuggling and anti-piracy. They also undertake rescue operations.

- **Amphibious Warfare Ship :** Amphibious Warfare Ships are used to deploy ground troops during an amphibious assault. India has 10 Amphibious Warfare Ships.

- **Minesweeper :** A minesweeper is a small naval designed to clear mines in water and make the waterways safe for shipping and movement of own warships.

ACTIVITY 10.11

Find out the names of each type of ship used in the Indian Navy. Collect pictures of each type of ship and paste in your notebook.

Intext Questions   10.3

1. What is an attack Submarines ?

2. What is the role of Frigates ?

3. What is a Minesweeper ?

4. Highlight the task of a Destroyer.

10.3 The Indian Air Force, its Role and Equipment

The Indian Air Force was raised on 08 Oct 1932 as a supplementary support for the British Air force. It was called Royal Indian Air Force. Post-independence, after the country became Republic in 1950 the Royal Indian Air Force was rechristened Indian Air Force (IAF). Since 1950 the IAF has participated in four wars with Pakistan and one with China. The IAF has excelled in operations like Operation Vijay, Operation Meghdoot, Operation Cactus and Pawan.

The IAF's has also been shouldering the responsibility of actively contributing with its manpower and aircrafts for the United Nations Peace Keeping Missions. The IAF today is ranked fourth in the world owing to its might and professionalism. It is modernising at an accelerated pace and stands as a credible air power amongst the foremost Air Force powers in the world. The IAF has in its inventory, Fighters, Transport aircrafts, Helicopters, Air Defence Missiles and Radars. The aircrafts held by the IAF are highlighted below :

10.3.1 Fighters

MiG-21 BISON- Single engine, single seater multirole fighter/ground attack aircraft of Russian origin which forms the backbone of the IAF. It has a maximum speed of

2230 km/hr (Mach 2.1) and carries one 23mm twin barrel cannon with four R-60 close combat missiles.

Jaguar- A twin-engine, single seater deep penetration strike aircraft of Anglo-French origin which has a maximum speed of 1350 km /hr (Mach 1.3). It has two 30mm guns and can carry two R-350 Magic CCMs (overwing) alongwith 4750 kg of external stores (bombs/fuel).

MiG-27- Single engine, single seater tactical strike fighter aircraft of Russian origin having a maximum speed of 1700 km/hr (Mach 1.6). It carries one 23 mm six-barrel rotary integral cannon and can carry upto 4000 kg of other armament externally.

MiG-29- Twin engine, single seater air superiority fighter aircraft of Russian origin capable of attaining maximum speed of 2445 km per hour (Mach-2.3). It has a combat ceiling of 17 km. It carries a 30 mm cannon along with four R-60 close combat and two R-27 R medium range radar guided missiles.

Mirage-2000- A single seater air defence and multi-role fighter of French origin powered by a single engine can attain maximum speed of 2495 km/hr (Mach 2.3). It carries two 30 mm integral cannons and two matra super 530D medium-range and two R-550 magic II close combat missiles on external stations.

SU-30 MKI- Twin seater, twin engine multirole fighter of Russian origin which carries One X 30mm GSH gun along with 8000 kg external armament. It is capable of carrying a variety of medium-range guided air to air missiles with active or semi-active radar or Infrared homing close range missiles. It has a max speed of 2500 km/hr (Mach 2.35)

Tejas - It is India's light combat aircraft and is the highest multi-role supersonic fighter aircraft of its class. It will contribute towards achieving self sufficiency in production of defence equipment.

10.3.2 Transport Aircrafts

Avro- Twin engine turboprop, military transport and freighter of British origin having a capacity of 48 paratroopers or 6 tonnes freight and maximum cruise speed of 452 km/hr.

Embraer- The main role of employment of this executive Jet Aircraft is to convey VVIPs/VIPs to destinations within India and abroad. Air HQ Communication Squadron operates this aircrafts and it has maintained a flawless incident/accident free track record till date.

Boeing 737-200 Twin engine turbofan, VIP passenger aircraft of American origin with total seating capacity of upto 60 passengers. It has a maximum cruise speed of 943 km/hr

AN-32-Twin engine turboprop, medium tactical transport aircraft of Russian origin with a crew of five and capacity to carry 39 paratroopers or maximum load of 6.7 tonnes. It has a max cruise speed of 530 km/hr.

IL-76 - A four engine heavy duty/long haul military transport aircraft of Russian origin with a maximum speed of 850 km/hr. It has a twin 23 mm cannon in tail turret and capacity to carry 225 paratroopers or 40 tonnes freight, wheeled or tracked armoured vehicles.

C-17- The aircraft is capable of carrying a payload of 40-70 tons up to a distance of 4200-9000 km in a single hop. It gives IAF strategic air lift capability and has been used effectively in evacuating people strandled in other countries like Yaman Libya.

C-130J- The aircraft is capable of performing para drop, heavy drop, casuality evacuation and can also operate from short and semi prepared surfaces.

Cheetah- Single engine turbo shaft, helicopter of French origin having capacity to carry 3 passengers or 100 kg external sling loads. It has maximum cruise speed of 121 km/hr and can climb to 1 km in 4 minutes.

Chetak- Single engine turbo shaft, light utility French helicopter with capacity of 6 passengers or 500 kg load. It has a maximum speed of 220 km/hr.

MI-17 V5- The Mi-17 V5 is a potent helicopter platform, equipped with modern avionics and glass cockpit instrumentation. They are equipped with state-of-art navigational equipment, avionics and weather radar.

MI-26- Twin engine turbo shaft, military heavy lift helicopter of Russian origin with carrying capacity of 70 combat equipped troops or 20,000 kg payload. It has a maximum speed of 295 km/hr.

MI-25/MI-35 Twin engine turbo shaft, assault and anti- armour helicopter capable of carrying 8 men assault squad with four barrel 12.7 mm rotary gun and upto 1500 Kg of ammunition including Scorpion anti-tank missiles. It has a maximum cruise speed of 310 km/hr.

ALH Mark III - It has been made indigenously by HAL. It filled with electronic warfare equipment. It can carry out military operations by day and night.

ACTIVITY 10.12

India has conducted some memorable military operations in the past. Find out about Operation Cactus Lily, Operation Vijay, Operation Meghdoot and Operation Pawan (Sri Lanka).

Note

Also watch these to know more about our Air Force:

https://www.youtube.com/watch?v=o4REqFw9r10&t=4s

https://www.youtube.com/watch?v=JSbOiExdx0U

Intext Questions 10.4

1. Name the agency that manufactures the Advanced Landing Helicopters (ALH).

2. Describe the role of Cheetahs.

3. Write a short note on Mirage 2000.

What You Have Learnt

India has the second largest army in the world. With a mammoth variety of military equipment presently in use in the Armed forces, it is important to know the role of each arm in the Armed Forces and the weapons and equipment that it uses to achieve its desired aim. We have briefly touched upon the characteristics of all weapons and equipments of the Indian Army, Navy and Air Force to give a first-hand knowledge on the subject. You have also studied Infantry, Artillery, Engineers, Army Air Defence, Army Aviation Corp, Signals. Relevant links to videos have been added for better assimilation and identification of the weapons, ships, helicopters and aircrafts.

Terminal Exercises

1. Explain the role of the infantry and the weapons and equipment that are authorised to it.

2. What are the tasks undertaken by the Navy?

3. Name the different types of ships and their assigned missions.

4. Why is Indian Air force considered to have unmatchable capabilities against its rivals? Explain by giving brief details of the fighter aircrafts that it has for its operational requirements.

Answers to Intext Questions

10.1

1. It can carry ten personnel including the crew.

2. It is an indigenously built tank with advanced features like the automatic target

locating, tracking and destruction. It has superior armour protection than the Russian T-90s.

3. ATGM : Anti Tank Guided Missiles

   HHTI : Hand Held Thermal Imager

   BFSR : Battle Field Surveillance Radars

10.2

1. Infantry is an arm of close combat with the task of closing in with the enemy to physically assault and capture ground. It is also required to prevent aggression on own territory. Owing to the proxy war being waged in Jammu and Kashmir and the insurgency movement in the North East, the infantry is heavily committed in undertaking Counter Insurgency and Counter Terrorist operations.

2. Its missions are mainly dedicated to casuality evacuation, ferrying of soldiers and supplies, recce and search and destroy operations.

3. The role of Artillery is to severely deplete the enemy's will to fight through heavy bombardment on its concentration areas, logistic hubs and forward localities before and during assault by own troops. They provide fire cover to infantry and armoured troops by softening enemy's resistance. They keep the enemy's head down and assist our troops in launching assaults with minimum casualty.

10.3

1. An attack submarine is a submarine that can sail under water and attack and sink other submarines, surface ships and merchant vessels. It could be deployed in groups/alone or assigned to protect other ships (like aircraft carriers).

2. Frigates are warships that are smaller than destroyers and are employed to protect other warships and merchant marine ships. They can also be used in anti-submarine, anti-aircraft and anti-surface roles.

3. A minesweeper is a small naval warship designed to clear mines in water and make the waterways safe for shipping and movement of own warships.

4. A destroyer as the name suggests is a fast and versatile long-endurance warship. It is employed to escort bigger ships (like aircraft Carriers) and engage in anti-submarine, anti-aircraft and anti-surface warfare.

10.4

1. Hindustan Aeronautical Limited (HAL) at Bengaluru.

Note

2.   They are used for Search and Rescue (SAR) Operations and Casualty Evacuation.

3.   Mirage 2000s are single seater air defence and multi-role fighter of French origin powered by a single engine. It can attain max speed of 2495 km/hr (Mach 2.3). It carries two 30 mm integral cannons and two matra super 530D medium-range and two R-550 magic II close combat missiles on external stations.

11

MODERNISATION OF THE INDIAN ARMED FORCES

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India is an aspiring super power. To achieve its destined place among the elite armies of the world it requires to modernise its armed forces. The desire to modernise is also propelled by the continuous threat from its immediate neighbourhood.

The continuing clashes over unresolved boundary disputes with China and Pakistan, terrorism in Jammu and Kashmir, insurgency in the North Eastern states, the uncontrolled menace of left wing extremism, and the rising challenges from urban terrorism has further complicated India's security environment. To fight a modern day war it must have modern day weapons.

Objectives

After studying this lesson you will be able to:

- explain the necessity for modernisation of the armed forces i.e. Army, Navy and Air Force and

- assess the challenges that are facing India in rapid modernisation.

11.1 Modernisation of the Armed Forces

Ideally any country should have 1/3rd of its military hardware of vintage origin, 1/3rd should be state of the art and the balance should be futuristic. With an intention to speed up the pace of modernisation of the existing military equipment many policy decisions and actions have been taken to overhaul the entire war machinery of our country. The focus is both on acquiring the latest military hardware from the international market as also to manufacture them indigenously. We shall discuss each of the Arms i,e Army, Navy and Air Force separately.

11.1.1 Army

The present security threat at our borders with China and Pakistan as also the pressing

requirement for upgrading our ageing weapons and ammunition has propelled the government into fast tracking the procurement process. The modernisation plan have been prioritised to give the Army the cutting edge over its contemporary rivals. Some of the planned acquisitions are highlighted as under :

- Process to acquire 7 lakh Assault Rifles, 44,000 Light Machine Guns and 44,600 Carbines has been initiated in Sep 2017. These are the basic personal weapons for a soldier and his smallest fighting unit, the section.

- The effort is also on to make the weight of the battle load lighter by procuring lighter personal kit, ballistic helmets with communication facilities as also lighter weapons and body armour (bullet proof jackets).

- Battlefield Management Systems (BMS)- The BMS is aimed to integrate combat units- armoured, artillery and infantry regiments, infantry battalions, helicopter flights, etc. - into a digital network that will link together all components of the future battlefield. It will enable the senior commanders to know the precise location of every soldier and weapon with whom commanders can exchange reports, photos, data and verbal and written communications.

- The mechanised forces are being modernised with Tanks and Infantry carrying vehicles to make them more versatile in terms of operability, mobility and lethality. India proposes to progressively induct as many as 248 Arjun Main Battle Tanks, 1,657 Russian-origin T-90 Main Battle Tanks, apart from the on-going upgrade of its T-72 Tank fleet.

- The improved features are night vision capabilities with a thermal imaging system for detecting all kinds of missiles, mine ploughs to dig out mines, the ability to fire anti-tank missiles, Advanced Air Defence gun capable of shooting down helicopters with a 360 degree coverage, Automatic Target Tracking (ATT) providing a greater accuracy when it comes to moving targets and superior Laser Warning and Control systems. There are also six additional regiments being raised for High Altitude conditions.

- The Indian Army will also upgrade its entire (BMP-2). Infantry Combat Vehicle (ICV) fleet to enhance their ability to address operational requirements. Upgrades include integration of the futuristic fire control system, twin missile launchers and commander's thermal imaging panoramic sights, anti- tank guided missiles as well as automatic grenade launchers.

- Under the Field Artillery Rationalisation Plan, the army plans to procure 3000 to 4000 artillery guns at a cost of US$3 billion. This includes purchasing 1580 towed, 814 mounted, 180 self-propelled wheeled, 100 self-propelled tracked and 145 ultra-light 155 mm/52 calibre artillery guns. After three years of searching and negotiations, India ordered 145 ultra-light 155 mm/52 howitzers from USA in September 2013.

- The Army Air Defence is an extremely important arm as it provides Low Level Air Defence. Two Regiments of indigenous Akash Missiles have been ordered from DRDO. Further trials are on for Very Short Range and also Short Range missiles.

- High Technology aspects concern Artificial Intelligence, Robotics, Nano Technology, Non- Lethal Weapons, Directed Energy Weapons and NBC warfare. Research in all these fields is progressing at a steady pace. Artificial Intelligence and Robotics are in a nascent stage of development. Rapid strides are needed to be taken in the field of Nano technology and it would lead to reduction of size and weight which would be suitable for our High Altitude and Glaciated regions.

11.1.2 Navy

The Indian Navy has been focusing on developing indigenous capabilities, systems, sensors and weapons as part of the nation's modernisation and expansion of its maritime forces. To secure our maritime Exclusive Economic Zones as also to maintain credible deterrence in the Indian Ocean our naval ships and aircrafts are deployed from the Gulf of Aden to the Western Pacific on an almost 24x7 basis.

The emerging threat from China in the Indo Pacific arena as also the Chinese muscle flexing by deploying more naval assets is posing security challenges which need to be addressed at the earliest. To mitigate such threats many actions have been taken for the modernisation of the Navy. The main highlights are as under:

- India has kick-started an ambitious project to build six nuclear-powered attack submarines that is expected to boost the Navy's overall strike capabilities in the face of naval build-up by other countries and increasing military manoeuvring in the Indo-Pacific region.

- There are 34 ships under construction and projects worth Rs 40,000 crores have been identified for participation of the private shipyards.

- In near future Indian Navy surface combatant fleet is likely to be

  - 03 Carriers

  - 10 Destroyers

  - 24 Frigates

  - 20 Corvettes

  - 20 Submarines

- Indian warships' primary air-defence cover is provided by the Barak-1 Surface to Air Missile. An advanced version of Barak-8, developed in collaboration with Israel has also entered service. India's next-generation Scorpene class

submarines will be armed with the Exocet anti-ship missile system. Among indigenous missiles, a ship-launched version of Prithvi-II, called the Dhanush, which has a range of 350 kilometres (220 mi), can carry a nuclear warhead.

- The Indian Navy is inducting the indigenous HAL Dhruv as a multi-role utility platform. In the long-range maritime reconnaissance (LRMR) role, the navy uses Boeing P-8I Neptune and has issued a global tender for nine medium-range maritime reconnaissance (MRMR) aircraft for coastal defence.

- Attack submarine INS Chakra and the development of INS Arihant make the Indian Navy one of six navies worldwide, capable of building and operating nuclear-powered submarines.

11.1.3 Air Force

The IAF is authorised 42 squadrons of Aircrafts. Each Squadron is authorised 18 aircrafts. Today it has a strength of 32 squadrons only. It also had to phase out its vintage MiG 21 and MiG 27 fleet that together form 11 squadrons. With threats looming large on two fronts i,e China and Pakistan, the IAF is in dire need of upgradation and modernisation. To augment the fighting potential of the IAF, the steps being taken are highlighted as under:

- 36 Rafale Fighter aircrafts, the state-of-the-art fighter aircrafts, are being purchased from France. The delivery is to begin soon.

- The other deal that has started rolling are the 83 Tejas 1A aircraft. Tejas is a single engine, multi-role fighter aircraft designed and built by India.

- A deal for 22 Apache AH 64 attack helicopters and 15 Chinook heavy-lift helicopters was signed in September 2015 when Prime Minister visited US. Both the helicopters are manufactured by Boeing. The Apaches will replace the aging MI 35E attack helicopters while the Chinooks will serve as a replacement for the MI 8 Russian helicopters.

- IAFs acquisition of the C-130J Super Hercules and C-17 Globe master III has increases the needs of special missions also of the strategic military lift capability.

- IAF has started upgrading its combat aircraft fleet since the last few years in order to enhance its operational capability and maintain its aircraft as modern weapon platforms, capable of meeting the present challenges posed by the security scenario in our region. It is also considering to upgrade its medium lift helicopters comprising MI-8, MI-17 and MI-17-IVs, as also the AN - 32 transport aircraft, with the aim of improving their overall capability.

- There are also plans to induct very many advanced aircrafts in the field of Mid Air Refuelling, Trainer jets, Airborne Warning systems, Unmanned Combat Aerial Vehicle, Cruise and Surface to Air Missile Systems.

Note

Intext Questions | 11.1

1. Ship-launched version of Prithvi-II is called the _____.

2. IAF is planning to phase out MIGs ___ and ____ from service.

3. The Apaches will replace the aging _____ attack helicopters.

11.2 Challenges in implementation of Modernisation of Armed Forces

You have seen how advances in science has improved the weapon system and fighting capabilities of the armies the world over. Economy pays a major role in modernisation of the armed forces. We have to balance our requirements to maintain and modernise the armed forces with other development efforts. The major aspects that need to be understood on modernising the armed forces are given below:

- **A Military Strategy to address National Security-** National security is determined by the threats that a nation faces. Military strategy is the ability to identity and respond to a threat. In olden times armies fought in battlefield. Today there are terrorist, insurgency and cyber threats. The armed forces have to modernise to face such threats.

- **Economy -** The country's economy is determined by the Gross Domestic Product (GDP). The bigger the GDP the faster is the economic growth. Faster the economic growth, quicker will be the modernisation of the armed forces.

- **Adequate Budget Allocation -** Defence is allotted budget every year as part of the country's yearly budget. Modernisation requires a huge allocation since modern arms and ammunition are purchased from other countries. This allocation of budget depends upon the economic growth. India is now under 'Make in India' project and is hoping to reduce dependence on other countries and also save money.

- **Research in Military Technology, Artificial Intelligence and Cyber Warfare -** A portion of the defence budget is given to research and development. A good research and development will make the country self sufficient in critical technology. For this we must modernise Defence Research and Development Organisation (DRDO), and Defence Public Sector units such as, Ordinance Factory Board (OFB), Bharat Electronics Limited, Bharat Heavy Electrical etc.

Intext Questions | 11.2

1. India is largest importer of arms in the world.   True or False

2. What is the full form of DRDO?

3. Name any one DPSU.

4. Mention any three challanges being faced by the Armed Forces in the way of modernisation.

ACTIVITY 11.1

Do you know how many Defence Public Sector undertakings are there in India? Find out their numbers, names and the items being manufactured by each enterprise.

What You Have Learnt

In this lesson you have learnt about threat perceptions in our neighbourhood and thereafter the various modernisation proposals which are in the planning stages or in the delivery stage. The reasons for the slow pace of modernisations have been enumerated.

Terminal Exercises

1. What are the major weapons that are being planned to be procured for the Army?

2. Explain the challenges facing the Army's modernisation programme.

3. Why does Indian Armed Forces need urgent modernisation?

Answers to Intext Questions

11.1

1. Dhanush

2. MIG 21 and MIG 27

3. MI 35 Helicopters

11.2

1. True

2. Defence Research Development Organisation

3. Hindustan Aeronautics Limited

4. Challenges

   (i)   A military strategy to address national security.

   (ii)   Economy

   (iii) Adequate budget allocation

12

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NUCLEAR WARFARE

In the previous module, we have learnt about the various conventional weapon systems held by the Indian Armed Forces. We also learnt about the future military technology. Both conventional weapons and non-conventional weapons are used in present day warfare. Nuclear, biological and chemical warfare are weapons of mass destruction or popularly called WMD. Biological & Chemical weapon systems and warfare are banned under the international rules and treaties. However, the use of these weapon systems by nations cannot be ruled out.

In this lesson we will learn about the nuclear warfare. We will also learn about the various basic terms of nuclear reactions. A brief insight into what is a nuclear weapon and the various effects of nuclear weapon will also be given. The various protection mechanism against the nuclear effects will also be discussed.

Objective

After studying this lesson, you will be able to:

*   define the basic terms used in nuclear science;

*   explain the energy yield of nuclear explosion;

*   list the characteristics of a nuclear explosion;

*   explain the effects of a nuclear explosion;

*   explain the meaning of nuclear radiation and

*   suggest the protective measures to be taken against the effects of a nuclear explosion.

12.1 Basic Terms

12.1.1 Nuclear Energy

In a conventional explosion such as bombs, the energy released results from chemical

reactions of the atoms of hydrogen, carbon, oxygen, and nitrogen present in the high-explosive material. In a nuclear reaction, redistribution or a recombination of the protons and neutrons of the atoms takes place. This produces the energy that is tremendously greater than the conventional energy.

Two kinds of nuclear reactions are used for the production of large amounts of energy in a short time. They are known as 'fission' (splitting) and 'fusion' (joining together). The fission process takes place with some of the heaviest (high atomic number) nuclei such as plutonium, which are split into smaller nuclei. In this process, a large amount of energy is released. Fission, on the other hand, involves some of the lightest (low atomic number) nuclei such as Helium and Hydrogen combining together to release energy.

12.1.2 Fission

When a free (or unattached) neutron enters the nucleus of a fissile atom, it can cause the nucleus to split into two smaller parts. It is accompanied by the release of large amount of energy. This is called the fission process. The materials used to produce nuclear explosions by fission are certain isotopes of Uranium and Plutonium. Uranium consists mainly of two isotopes. The Uranium isotopes are Uranium- 235 (about 0.7 per cent), and Uranium-238 (about 99.3 per cent). Uranium-235 is readily fissile and is commonly used in nuclear weapons. Another isotope, Uranium-233 is also readily fissile. Uranium-233 is made artificially from Thorium-232. Plutonium-239 is yet another fissile isotope used in nuclear weapons made artificially from Uranium-238.
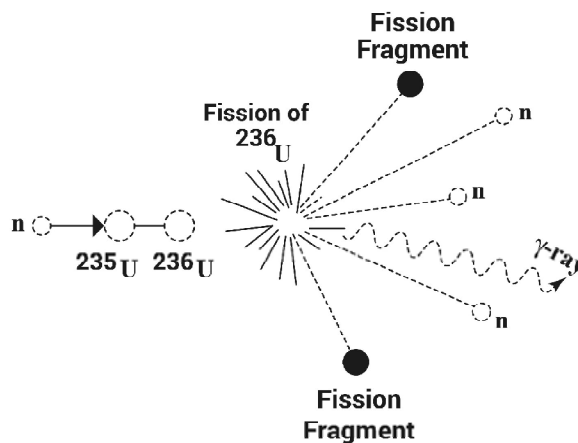
Fig 12.1 – Fission Process

12.1.3 Fusion

In nuclear fusion, a pair of light nuclei unite (or fuse) together to form a nucleus of a heavier atom. For example the fusion of the Hydrogen isotope is known as Deuterium or 'heavy hydrogen'. Under suitable conditions, two Deuterium nuclei may combine to

form the nucleus of a heavier element - Helium, with the release of energy. A nuclear fusion reaction is brought about by means of very high temperature, and they are thus referred to as 'thermo-nuclear processes'.
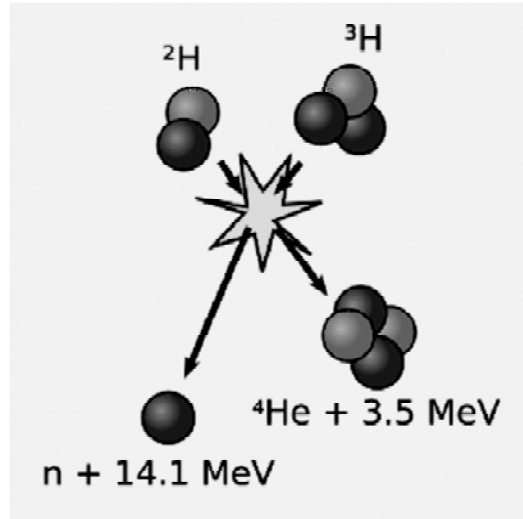
Fig 12.2 – Fusion Process

12.1.4 Chain Reaction

A chain reaction or nuclear chain reaction is a sequence of reactions. A reactive product or by-products from the first reaction followed by additional reactions to take place. In a chain reaction, positive feedback leads to a self-amplifying chain of events. In nuclear chain reaction a high speed neutron is used to bombard the nucleus of the fissile atom. This breaks the nucleus into
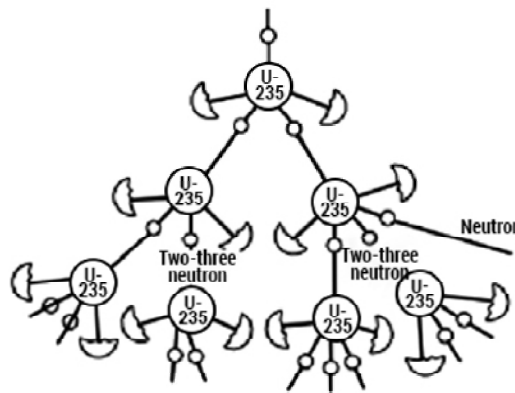
Fig. 12.3

smaller atoms and in the process also releases additional high-speed neutrons. These high-speed neutrons bombard with the other atoms of fissile material. This process continues to form a nuclear chain reaction. The uncontrolled nuclear chain reaction leads to the release of large amount of heat energy, which causes destruction.

Module - V

**Warfare and
Its Types**

Note

12.2 Energy Yield of Nuclear Explosion

The 'yield' of a nuclear weapon is a measure of the amount of explosive energy it can produce. The yield is expressed in terms of the quantity of TNT that would generate the same amount of energy when it explodes. Thus, a 1 Kiloton (KT) nuclear weapon is one which produces the same amount of energy in an explosion as does 1 kiloton (or 1,000 tons) of TNT. Similarly a one megaton (MT) weapon would have the energy equivalent of 1 million tons of TNT.

12.2.1 Types of Bursts

A nuclear bomb can be made to burst on ground, air or higher in the atmosphere. Depending on the location or point of burst in relation to the surface of the earth, the effects of a nuclear blast varies. The point of nuclear explosion may be therefore classified as follows: -

(a) **Exo-Atmospheric:** A burst occurring outside the earth's atmosphere (over 30kms above the earth's surface) is called an exo-atmospheric burst.

(b) **Endo-Atmospheric:** A burst, which occurs within the earth's atmosphere, is called an endo -atmospheric burst. These can be further divided into:-

   (i) **High Altitude Air Burst :** A high altitude burst is defined as the one in which the explosion takes place at an altitude in excess of 30,000 m. At these heights, the air density is so low that the interaction of the weapon energy with the surroundings is markedly different from that at lower altitudes. The effects of blast, thermal and nuclear radiations of such bursts are negligible at ground level but radar and wireless communications may get affected over a large area for a long duration.

   (ii) **Air Burst:** When a nuclear explosion takes place below 30,000 m of altitude, the weapon residue immediately incorporates material from the surrounding medium and forms an intensely hot and luminous mass, which is roughly spherical in shape. For an airburst, the height of burst should be such that the fireball does not touch the surface of earth.

   (iii) **Surface or Ground Burst :** When the point of burst is such that the fireball touches the surface, then it is a surface burst.

   (iv) **Sub-Surface Burst :** When the point of burst is beneath the ground, it is a subsurface burst. A very shallow burst is indistinguishable from a surface burst because the fireball will still be produced above the ground. In a deeper burst, a gas bubble will be formed, instead of fireball.

   (v) **Underwater Burst:** When the point of burst is under the sea, it is an underwater burst.

Intext Questions **12.1**

1. Fill in the blanks:-

   (a) The chemical reaction in which a pair of light Nuclei unites together to form a nucleus of a heavier atom is called _____ reaction.

   (b) The chemical reaction, which causes the nucleus to split into two smaller parts, is known as _____ reaction.

2. Mention the different types of Endo-atmospheric bursts.

3. What is meant by thermo-nuclear process?

12.3 Characteristics of Nuclear Explosion

The characteristics of a nuclear explosion would vary depending upon the type of burst. They are: -

(a) An intense bright flash.

(b) A fireball.

(c) A thermal heat pulse of thermal radiation.

(d) A pressure wave-giving rise to blast and shock.

(e) Radiation.

   (i) Initial radiation.

   (ii) Residual radiation from neutron induced activity in the ground and the fall-out of radioactive material.

   (iii) Transient radiation effects on electronics (TREE).

(f) Electro-magnetic phenomenon.

(g) A prominent cloud.

ACTIVITY 12.1

Watch the movie "BBC History of World War II Hiroshima". Follow the link:-

https://www.dailymotion.com/video/xlk8my

or

http://www.documentarytube.com/videos/history-of-world-war-ii-hiroshima

Note

Q **Intext Questions** **12.2**

1. TREE stands for _____

2. Name any two types of radiations.

12.4 Effects of Nuclear Explosion

Understanding the major effects of the nuclear explosion helps us to prepare better if an attack should occur. The effects of flash, heat, blast and radiation depends on the size and type of weapon, the weather conditions (sunny or rainy, windy or still); the terrain and height of explosion. In a nuclear attack, most of the people within a few km of the explosion will be killed or seriously injured by the blast, heat or initial radiation. Similarly, all the other natural and manmade structures will be either completely or almost destroyed. Let us see the effects of Flash, Heat and Blast that occurs from a nuclear explosion.

12.4.1 Flash Effects

- **Dazzle:** The intense flash from a nuclear burst can affect vision at long ranges due to dazzle and eye damage. Dazzle, (sometimes called 'flash blindness') is a temporary loss of vision resulting from the brightness of the visible burst. It will only be of significance to personnel unaffected by other nuclear effects. As a guide, in daylight only those facing the burst are likely to be dazzled for about two minutes. At night, dazzle will affect those facing the burst for about 10 minutes and those facing away for about three minutes.

- **Eye Damage:** Retinal burns occur when the eye lens focuses the fireball image on to the retina. Shallow burns heal completely. Deep burns lead to permanent blind spots. However, sight is not normally lost completely.

12.4.2 Heat or Thermal Effects

Heat is a principal casualty producing effect. It is likely that some 50% of nuclear weapons casualties will suffer burns: -

(a) To exposed skin unprotected from the thermal pulse.

(b) From charred or burnt clothing and/or local fires.

- **Degree of Burns in Personnel :-**

  - First Degree- involve the top layer of skin.

  - Second Degree- involve the first two layers of skin.

  - Third Degree - involve all layers of the skin and cause permanent tissue damage

- **Heat Effects on Materials:** The thermal pulse delivers a large quantity of heat in a very short time. Damage will be related to the amount of heat absorbed. Fires started by the ignition of paper, fabric, netting, vegetation and other combustible material are likely to cause a major secondary hazard.

12.4.3 Blast and Shock Effects

The pressure wave from a nuclear explosion causes a blast wave in the air and a shock wave through the ground. It is likely to produce 35% casualties.

- **Effect on Personnel:** The human body has lot of resistance to the blast overpressure. The main danger is from indirect effects, such as: -
    - The collapse of buildings and field defences or overturning of vehicles.
    - The impact of flying debris.
    - Injuries caused to personnel by being picked up and flung by the wind.

- **Damage to Infrastructure:** The damage suffered by equipment and installations is likely to be:-
    - Antenna broken off; cables stretched and severed.
    - Vehicles, aircraft and equipment overturned.
    - Buildings and field defences collapses.
    - Earthworks collapsed by the ground shock wave.
    - Supplies, equipment and weapons blown away by the winds.

- **Terrain Effect:** The most significant terrain effect will be the falling down of structures and trees. Pressure wave follows ground undulations; hence terrain affords little protection from blast and shock.

The estimated size of the damage caused by the 16 KT and 22 KT atomic bombings of Hiroshima and Nagasaki is schematically depicted for you.
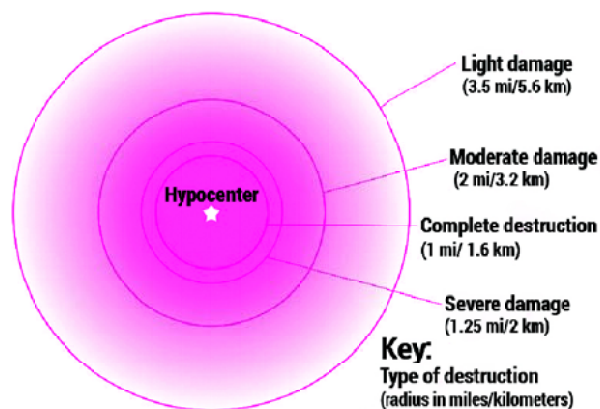
Fig 12.4 - An estimate of the size of the damage caused by the 16 KT and 22 KT atomic bombings of Hiroshima and NagasakiFig 12.3- Nuclear Chain Reaction

Module - V

Warfare and Its Types

Note

12.5 Nuclear Radiation

Nuclear radiation is divided into two categories:

(a) **Initial:** Initial radiation is defined as that emitted during the first minute following detonation. It consists of gamma radiation and neutrons produced during fission or fusion, which irradiate material.

(b) **Residual:** Residual radiation is that which remains after one minute, post detonation. It is essentially neutron induced activity and 'fallout' of radioactive material.

When a nuclear weapon detonates, many neutrons are released. These cause imbalances in the nucleus of weapon material, the atmosphere and in the elements they interact. Many of these substances become radioactive resulting into emission of alpha and beta particles accompanied by gamma radiation. The ground area beneath a nuclear burst can become highly radioactive due to this process.

12.5.1 Nuclear Fallout

A fireball contains vapourised weapon residue. Radioactivity is induced into this fireball material by neutron bombardment. As the fireball rises, it will cool and form a cloud, which stabilizes in height and size. At the same time, the radioactive particles in the cloud begin to fall back towards earth. These particles travel along with the wind to settle and form areas of radioactive contamination. If rain falls through the radioactive cloud, water falling on ground also contaminates the ground and is called 'rainout'.

12.5.2 Radiation Effects on Personnel

All forms of nuclear radiation can cause injury to man. Cell death or damage is caused by ionization of body cells by gamma radiation. Blood cells, the stomach lining and the skin are more readily damaged than bones and muscle. Beta particles on or close to the body cause 'beta burns' in the form of lesions or blisters, which can take long time to heal and are open to infection. Alfa particles cause intense ionization of body cells, if in contact. Any radioactive particles ingested or otherwise admitted to the body may be toxic, in addition to the hazards created from radiation.

- **Symptoms of Radiation Damage:** The symptoms of radiation effects in personnel are usually described as 'radiation sickness'. Some of them are given below: -

  - Initial symptoms of headache, nausea, vomiting, diarrhea and general malaise.

  - A symptom-free period with apparent recovery.

- The development of latent symptoms such as loss of hair and appetite, sore throat, fever, hemorrhages, prolonged incapacitation or death.

- **Radiation Sickness:** The human body has some ability to repair the damage caused by radiation but this is not complete. Radiation doses have a cumulative effect. A person receiving a dose of 100 centi Grays (cGys) on three occasions accumulates a total of 300 cGys (Gray is the unit of measure of nuclear radiation. It is also called rads). The damage and symptoms, however, depend not only on the dose but also on the rate of receipt each time and the interval between exposures. Individuals are affected by radiation to different degrees, hence radiation dose figures should only be regarded as a guide: -

  - Below 150 cGys - no long term effects for most personnel.

  - From 150 to 450 cGys - some incapacitation with possible death.

  - From 450 to 800 cGys - incapacitation and death most likely in the ensuing weeks.

  - Above 800 cGys - severe incapacitation and certain death.

12.5.3 Radiation Effects on Electronics

The initial radiation pulse mainly consists of gamma rays and neutron flux. When they directly interact with electronic components, a phenomenon called Transient Radiation Effect on Electronics (TREE) occurs. The pulse of high-energy gamma rays lasts for a fraction of a second. It may destroy semiconductor devices by direct interaction. The neutron flux accompanying the gamma rays can affect semiconductors by changing their electrical characteristics such that performance is temporarily or permanently altered.

12.5.4 Electromagnetic Phenomena

Electromagnetic phenomena are immediate effects of a high altitude airburst or air burst. They can be divided into following categories: -

- **Atmospheric Ionization:** A nuclear explosion causes ionization of the atmospheric layers and changes their electrical characteristics. This disturbs the transmission of electromagnetic waves from radio and radar equipment, which pass through these disturbed areas. Periods of disruption may be short (a few seconds), but some systems could be blacked out for several hours until earth's magnetic field returns to normal.

- **Electro-Magnetic Pulse (EMP):** EMP is a very powerful burst of broadband radio energy of very short duration. It is harmless to man. The very high energy associated with EMP can cause damage to electrical and electronic equipment,

Note

which may be permanent, interruptive or transient. For example it may cause: -

- Breakdown of insulation in cables and components

    - Tripping of relays and circuit breakers

    - Burnout of components within equipment

    - Corruption or clearance of electronic data stores

    - Explosive failure of susceptible equipment, which may cause human injury as a secondary effect.

12.5.3 The Fireball and the Radioactive Cloud

(i)   The Fireball: A nuclear explosion leads to the liberation of a large amount of energy in a very small period of time within a limited quantity of matter. Because of the great heat produced by the nuclear explosion, all the materials are converted into the gaseous form. These gases cause tremendous pressure and lead to the formation of an extremely hot and highly luminous (incandescent) spherical mass of air and gaseous weapon residue, which is called the fireball. The surface brightness decreases with time, but after about a millisecond, the fireball from a 1-MT nuclear weapon, would appear to an observer, 80 kilometers away, to be many times brighter than the sun at noon.

(ii)   The Radioactive Cloud: While the fireball is still luminous, the temperature in the interior is so high that all the weapon materials are in the form of vapour. As the fireball increases in size and cools, the vapour condenses to form a cloud, also called the mushroom cloud, consisting of solid particles of the weapon debris, as well as many small drops of water derived from the air sucked into the rising fireball.

Fig 12.5 – Mushroom   Source : wikipedia.com

Note

Intext Questions   12.3

1.   Fill in the blanks.

   (a)   EMP stands for _____.

   (b)   The electromagnetic phenomena consist of _____ and _____.

   (c)   Degree of burns in personnel is classified as _____.

2.   Mention the different categories of radiations.

3.   List the initial symptoms of radiation sickness.

12.6 Protective Measures to be Taken Against the Effects of a Nuclear explosion

If you are in a city that is about to be hit by a nuclear missile, is there anything you can do that will increase your chances of survival? It entirely depends on where you are when the blast happens. Close to the fireball, the thermal energy is so intense that infrastructure and humans are incinerated. Underground bunkers and other facilities would do little as they too would be almost completely destroyed and there would be barely a physical trace that one ever existed. However, if you are a few miles away from the explosion your chances of survival are better.

12.6.1 The protective measures

Measures can be classified as individual protection and collective protection. The Individual Protective Equipment (IPE) or Personal Protective Equipment (PPE) consists of the following:-

(a)   Two piece over-garment (coat and trousers) worn over Battle Dress or Uniform;

(b)   Mask and respiratory protection consisting of filter canister with HEPA filter (which provides protection against radiological and biological particulates) and a charcoal filter (which provides protection against chemical weapon vapors);

(c)   Gloves;

(d)   Over-boots;

(e)   Additional components like detection equipment, individual decontamination kit and antidotes for chemical hazard events
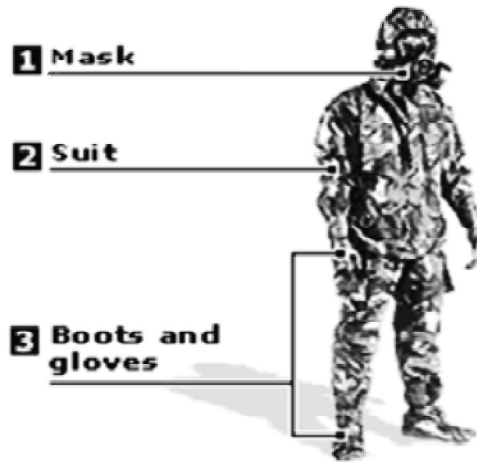
Fig 12.7 - Individual Protective Equipment

12.6.2 The collective protection

The collective protection is provided by construction of Nuclear Biological and Chemical (NBC) protected underground shelters. The shelter should be well stocked with food, water, medicines and should have working phone lines, a radio and other communication devices.

Intext Questions 12.4

1. IPE or PPE consists of (a) _____, (b) _____, (c) _____, (d) _____ and (e) _____.

2. The protective measures can be classified as _____ and _____.

3. Which essential materials should be stocked the by NBC Shelters.

4. Which type of communication facilities should the shelters have collective for protection ?

What You Have Learnt

• Simple and basic science of fission and fusion behind nuclear explosions and how it is used in a nuclear bomb;

• The various military terms of types of bursts which are Exo atmospheric and endo Atmospheric bursts of the nuclear bomb.

• What happens when a nuclear bomb is exploded. The bomb explodes into a mushroom shaped cloud giving intense head and blast. Then there is the nuclear fallout;

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- The effects of a nuclear bomb on humans and materials, which includes the blast, heat, radiation and electro magnetic effects;

- The protection required to be taken at the individual and collective level along with the quipment required in both the cases.

Terminal Exercises

1. Explain a nuclear chain reaction.

2. Explain radiation effects on personnel and infrastructure.

3. Distinguish between a Fireball and a Radioactive Cloud

4. What type of protective measures should be taken against the effects of a nuclear explosion?

Answers to Intext Questions

12.1

1. (a) Fusion

   (b) Fission

2. (i) High Attitude   (ii) Air Brust   (iii) Surface as Ground Bust

   (iv) Under Water Brust

3. A nuclear fission reaction is brought about by means of very high temperature. This is reffered as thermo-nuclear process.

12.2

1. Transient radiation effects on electronics

2. Initial radiation and Residual radiation

12.3

1. (a) Electro-Magnetic Pulse

   (b) Atmospheric Ionization and Electro-Magnetic Pulse

   (c) I Degree, II Degree and III Degree

2. Initial and residual

3. Headache, nausea, vomiting, diarrhea and general malaise

Note

Note

12.4

1. (a) Two piece over garment

    (b) Mark and respiratory protection

    (c) Gloves

    (d) Over-boots

    (e) Additional components

2. (i) Individual protection

    (ii) Collective Protection

3. Food, water, medicines

4. Working phones, a radio and other communication devices

13

BIOLOGICAL WARFARE

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In the previous lesson we have learnt about nuclear warfare. Now, we will learn about biological warfare (BW), also known as germ warfare. It is the use of biological toxins or infectious agents such as bacteria, viruses, and fungi for war. The intent could be to kill or incapacitate humans, animals or plants by using biological agents as an act of war.

Biological weapons are living organisms that reproduce or replicate within their host victims. Biological weapons may be employed in various ways to gain a strategic or tactical advantage over the enemy. Biological weapons may also be useful as area denial weapons. These agents may be lethal or non-lethal, and may be targeted against a single individual, a group of people, or even an entire population.

Like nuclear weapons, the use of biological weapons is also prohibited under customary International Humanitarian Law and International Treaties. The use of biological agents in armed conflict is a war crime.In this lesson we will learn about the biological warfare to include the basic terms used, the types of biological warfare agents, its characteristics, selection of BW agents and delivery means.

Objectives

After studying this lesson, you will be able to:

* define the basic terms used in Biological Warfare;

* classify the types, characteristics and selection of BW agents and

* explain the meaning of delivery of BW agents and their routes of entry into human body.

13.1 Basic Terms and Definitions

(a) **Biological Agent -** A biological agent is a micro-organism which causes disease in man, plants or animals, or causes the deterioration of material.

(b) **Biological Warfare (BW) -** Biological warfare is the use of biological agents

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Note

to produce casualties in man or animals and damage to plants or material and defence against such use.

(c) **Aerosol -** An aerosol is a suspension of small particles (liquid or solid) in air. Mist and smoke are examples of aerosol. The size of the particle should not exceed 5 microns (1 micron or 1 micrometre = 1×10^{-6} metre = 0.001 mm)

(d) **Toxins -** Toxins are metabolic products of bacteria. They cause poisoning of organisms.

Intext Questions 13.1

1. Fill in the blanks:-

   (a) An aerosol is a suspension of _____.

   (b) Biological agent is a _____ .

2. What are toxins?

13.2 Types, Essential Characteristics and Selection of BW Agents

13.2.1 Types of Biological Agents

A biological agent is one which is highly infectious, easily produced and stored. They should be stable and suitable for use in the field. They should be able to produce a disease for which there is minimal immunity in the target population. There are four primary groups of microorganisms from among which a biological warfare agent is likely to be drawn.

They are classified as

(a) Bacteria

(b) Rickettsia

(c) Virus

(d) Fungi

(a) **Bacteria:** Bacteria are small, free-living microscopic organisms. They can be grown easily in the laboratory. They are distinguished from the cells of other organisms in having primitive non- membrane-enclosed nuclei. They are therefore said to be 'prokaryotic'. Certain bacteria, under unfavourable conditions, undergo change into a state of inactiveness and are called Spores. The spores become active when suitable or favourable conditions prevail. It is considered to be a defence mechanism because such bacteria can survive under unfavourable

conditions for a long period extending to years. The bacteria, which form spores, are also known as persistent BW agents. Bacillus anthracis, cause of anthrax, is a very important BW agent, which produces spores.

(b) **Rickettsia:** These are primarily parasites of insects and appear only secondary in man and other animals. The microorganisms characteristically inhabit the cell lining of the intestines and other tissues of the insects. They are found in a certain group of blood sucking insects, such as fleas, mites, lice and ticks. The rickettsia causes no injury to the insects but is often pathogenic to men and other animals. Some rickettsia cause diseases that are severe and often fatal. They are susceptible to antibiotic treatment. They grow only within living cells like viruses.

(c) **Viruses:** A virus is a small infectious agent that replicates only inside the living cells of other organisms. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria. Viruses are not cellular and therefore do not possess typical structures of a cell. No specific treatment is available against viruses; viruses do not respond to antibiotic treatment. However vaccination is effective. e.g. Small Pox

(d) **Fungi:** A fungus (plural - fungi) is any member of the group of organisms that includes microorganisms such as yeasts and molds. The most common example is mushrooms. Fungi may be regarded as primitive plants that do not produce its own food. They draw nutrition from decaying vegetation matter. Most fungi can exist either in a yeast-like state or as resistant spores. The fungi which produce toxins (mycotoxins) are important BW agents.

13.2.2 Essential Characteristics of BW Agents

A majority of BW agents employ germs. Some of these organisms can only grow and reproduce under suitable conditions and they are regarded as non-persistent as they are extremely susceptible to variation in temperature, humidity and sunlight. Some agents, such as anthrax, are highly resistant to climatic effects and can be classified as persistent. Some important and essential characteristic BW agents are: -

• **Infectivity:** The infectivity of microorganisms is defined as its ability to cause disease. A greater infectivity means that fewer microorganisms are required. It means how fast the microorganisms can enter the body of the target.

• **Virulence:** The infective penetration of sufficient microorganism may produce diseases of different severity. The most virulent strain produces the most acute or severe effects and is a better BW agent.

• **Incubation:** The incubation period is the time between the infective penetration of sufficient microorganisms into the body and the appearance of the symptoms of the disease. It is normally not less than 24 hours.

- **Transmissibility:** Some microorganisms produce disease, which may be transmitted from man to man (e.g., Plague) which may cause an epidemic. However others do not, e.g., Anthrax. The greater the transmissibility, the better the BW agent.

- **Lethality:** Some microorganism will produce diseases which are usually lethal if the target population is not immune (e.g. Small pox). Others will give rise to illness which are incapacitating rather than lethal (e.g. influenza).

13.2.3 Selection of BW Agents

The characteristics of the BW agent chosen in terms of transmissibility, incapacitation, and/or lethality will depend on the effect required in the large population. For a micro-organism to be selected as a BW agent it must meet certain requirements:

(a) **Production:** Easy to produce in required quantity.

(b) **Storage:** Easy to store while maintaining its virulence. The BW agent may be stored as resistant spores (e.g. Anthrax), in liquid growth media, or as a 'freeze-dried' powder.

(c) **Dissemination:** The microorganisms must remain viable during transit and delivery.

(d) **Immunity:** No widespread or naturally acquired immunity against the chosen microorganism should exist in the target population.

(e) **Sensitivity to Environment:** Various environmental factors affect the use of microorganisms as air-borne BW agents and thus reduce their effectiveness: -

   (i) **Atmospheric Stability:** A BW agent cloud may get rapidly dispersed in unstable atmospheric conditions.

   (ii) **Wind Speed:** A high wind speed will carry an agent cloud quickly past the victim who may therefore be less at risk.

   (iii) **Temperature and Humidity:** The survival of BW agents is best assured by conditions of low temperatures and high humidity.

   (iv) **Atmospheric Pollution:** Because of its chemical nature, atmospheric pollution has an adverse effect on BW agent.

   (v) **Sunlight:** Most microorganisms are killed by exposure to ultra-violet light (sunlight); spores are an exception. BW attacks are therefore more likely at night. The appearance of sunlight could be used to limit the spread of the attack.

   (vi) **Precipitation:** As the BW agents tend to have very small particle size, they are unlikely to be washed out of the atmosphere by rain and snow.

Intext Questions 13.2

1. Fill in the blanks

   (a) The BW agents are drawn from four primary groups of organisms called
   (i) _____ (ii) _____ (iii) _____ (iv) _____.

   (b) _____ is found in a certain group of blood sucking insects, such
   as fleas, mites, lice and ticks.

   (c) Incubation period is normally not less than _____ hours.

   (d) Certain bacteria, under unfavourable conditions, undergo change into a
   state of inactiveness and are called _____.

2. List the essential characteristics for selection of any two BW agent.

13.3 Means of Delivery of BW Agents and their Routes of Entry into Human Body

13.3.1 Delivery

The BW agents may be delivered in a liquid medium called microorganism 'soup' or as
an aerosol. The liquid medium protects the agent from excessive atmospheric drying,
provides a degree of nutrition to the agent while being delivered to the target and
protects the agent during the transition from liquid to aerosol state. The various modes
of delivery of BW agents are:-

(a) **Vectors:** The use of animals or insects, known as 'vectors' is used for the delivery
of microorganisms. However, in a BW attack, vectors cannot be relied upon to
behave in a predictable and concerted manner.

(b) **Explosive Munitions:** Explosive munitions normally consist of a small explosive
device, which is surrounded by the BW agent filled and enclosed in a thin metal
or plastic case. Each munition forms a bomblet within a full sized bomb or artillery
round. The bomblets are designed to disperse over a wide area when released.
On impact, the device explodes and disseminates the agent in an aerosol
suspension. The heat and shock of the explosion usually kills some of the micro-
organisms.

(c) **Generators:** Biological agent generators normally consist of a container that
has a source of pressure, which replaces the explosives charge. When the
generator is activated, the pressure forces the agent through the nozzle device
and creates an aerosol. The generator does not kill as many of the organisms as
an explosive bomblet and is relatively quiet in operation.

(d) **Spray Tanks:** Aircraft can carry spray tanks containing a large quantity of BW agent and are capable of producing effective aerosol over extremely large areas. The working of spray tanks is like generators to create the aerosol.

13.3.2 Routes of Entry

To cause disease, the BW agent has to penetrate into the human body. This can happen through the skin and eyes, by eating and drinking and/or by breathing.

(a) **Skin:** Penetration through the skin and mucous membranes may occur, particularly if the surface is damaged. The NBC IPE (Individual Protective Equipment) affords some amount of protection.

(b) **Digestive Tract:** The digestive tract provides a route of entry for contaminated food and drink. This route has some limitations like the digestive process destroys many BW agents, chlorination and water treatment destroys a majority of BW agents, cooking at high temperature kills almost all microorganisms.

(c) **Respiratory Route:** The breathing or respiratory route is the most significant and widely used. In this method, the infective dose required may be smaller and the onset of symptoms more rapid than normal.

Intext Questions 13.3

1. Fill in the blanks.

    (a) The use of animals or insects, known as _____ is used for the delivery of micro-organisms.

    (b) The _____ route is the most significant and widely used for entry of biological agents.

    (c) Aircraft carry _____ containing a large quantity of BW agent and are capable of producing effective aerosol over extremely large areas.

2. Name the various routes of entry of BW agent into the human body.

What You Have Learnt

The lesson on Biological warfare has taught you the basic aspects of this type of warfare. Some important highlights of the lesson are as follows:-

• The basic terms and definitions used in the study of biological warfare;

• Types, Essential Characteristics and Selection of BW Agents; The microorganisms such as virus, rickettsia that are used as agents;

• Essential Characteristics of BW Agents and their selection for use in battle;

Biological Warfare

- The means of delivery of biological warfare agents and their routes of entry into human body.

Terminal Exercises

1. Explain the following:

   (a) Biological Agent

   (b) Aerosol

   (c) Bacteria as biological agents

2. What is meant by the Sensitivity to Environment of biological agents?

3. Explain the various delivery methods of BW agent.

Answers to Intext Questions

13.1

1. (a) small particles (liquid or solid) in air like mist and smoke.

   (b) Micro organism which causes disease in men, plants or animals.

2. Toxins are metabolic products of bacteria. They cause poisoning of organism.

13.2

1. (a) Bacteria, Rickettsia, Virus and Fungi.

   (b) Rickettsia

   (c) 24

   (d) Spores

2. (i) Infectivity   (ii) Virulence   (iii) Incubation

   (iv) Trans missibility   (v) Lethality

13.3

1. (a) Vectors

   (b) Breathing or respiratory

   (c) Spray tanks

2. (i) Skin   (ii) Digestive Tract   (iii) Respiratory

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14

CHEMICAL WARFARE

After learning about Nuclear and Biological warfare, lets now understand Chemical warfare. Chemical warfare (CW) involves the use of toxic properties of chemical substances as weapons. Chemical agents are inorganic substances used in warfare to attack the organs of the human body in order to prevent the human body from functioning at all or to hinder its normal functioning. The results are usually disabling to a varying degree, or fatal. However, with proper protective equipment, training, and decontamination measures, the primary effects of chemical weapons can be overcome.

As per UN conventions, use of chemical weapons is banned. In recent incidents in Syria, chemical weapons affected a number of civilians. Even though there is a convention and ban on its use, chemical weapons can be used by countries. Therefore, it is important that we learn about chemical weapons and means of defence against it.

Objectives

After studying this lesson, you will be able to:

* classify the chemical agents on the basis of criteria and types;

* know the factors on which the duration of effectiveness depends;

* explain the types of chemical agents based on their effectiveness;

* identify the effects of chemical agents on the body;

* explain the characteristics and symptoms of agents like Nerve agents, Blister agents, Blood agents and choking agents;

* take protective measures against the various main groups of chemical agents and

* appreciate the requirements of a good chemical warfare agent.

14.1 Types of Chemical Agents

Chemical warfare includes the use of toxic chemical compounds in warfare as also the methods of combating such agents. Chemical warfare is as dreadful as nuclear warfare.

Chemical Warfare

It is imperative for the modern soldier to be able to understand the hazard of chemical weapons and the protective measures required to be able to survive in such an environment to be able to continue fighting effectively. The capability to wage chemical warfare is well within the means of several nations that cannot afford a nuclear armory and this poses a serious threat.

14.1.1 Types of Chemical Agents

Chemical agents are classified according to the following criteria: -

(a)   Military use and Effects on the body

(b)   Duration of effectiveness.

Classification of Chemical Agents

Criteria | Military use and effect on the body | Duration of Effectiveness

Types | Killer Agents | Non-persistent Agents
| Incapacitating Agents | Persistent Agent
| Riot Control Agents |

Table 14.1 - Classification of Chemical Agents
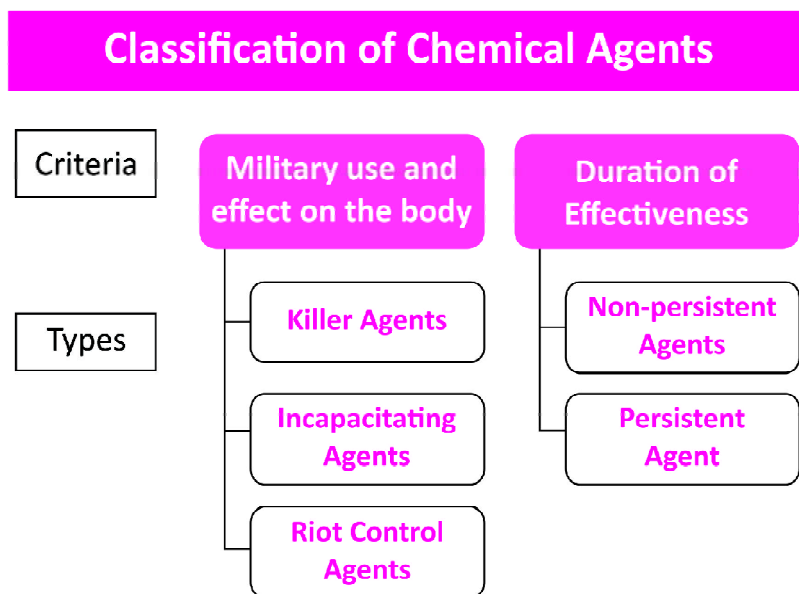
14.2 Duration of Effectiveness

The duration of effectiveness, that is the time for which the effects lasts, depends on many factors such as: -

(a)   The physical characteristics of the agent.

(b)   The amount of agent delivered and its physical state.

(c)   The weapon system used.

(d)   The weather in the target area at the time of the attack and afterwards.

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Warfare and Its Types

Note

14.3 Types of Chemical Agents Based on Effectiveness

Have you seen dew on grass or leaves in the morning? The dew is water droplet, which forms on leaves due to condensation in the atmosphere. Consider the dew drops as chemical agents. Then some chemicals disappear quickly like the dewdrop. These agents are called non-persistent agents. Other chemical agents remain in the atmosphere and on the objects where it was sprayed. These agents are called persistent agents. From the point of view of duration of effect the agents may be classified as follows: -

(a) **Non-Persistent Agents:** These agents disperse rapidly after release and present an immediate short duration hazard e.g. G agents (Nerve Agent), Hydrogen Cyanide (Blood Agent) etc.

(b) **Persistent Agent:** These agents continue to present a hazard for a considerable period after delivery by remaining a liquid contact hazard and by continuing to produce vapour by the evaporation of the liquid e.g. V agents (Nerve Agents), Sulphur Mustard (Blister Agent).

14.4 Effects on the Body

The third method of classification is to group agents by their action and effect on the body. Such groups are as follows:

(a) **Killer Agents:** These agents are used to kill humans and are deadly/ fatal. These are further classified as:-

    (i) **Nerve Agent:** These interfere with the nervous system and thus disrupt essential body functions like breathing, muscular control and vision. E.g., TABUN (GA), SARIN (GB), SOMAN (GD) and V agents.

    (ii) **Blister Agents:** These agents cause inflammation, blistering of the skin and superficial destruction of contaminated internal tissue, e.g., the lining of the breathing passage. Although classified as killers, blister agents do not cause death except in extreme cases. Examples are Mustard Gas (HD), Nitrogen, Mustard (HN 1 to HN 3) and Lewisite (L).

    (iii) **Blood Agents:** These prevent body tissue from using the oxygen in the blood. E.g., Hydrogen Cyanide (AC), Cyanogen Chloride (CK) and Arsine (SA).

    (iv) **Choking Agents:** These attack the breathing passage and lungs. E.g., Phosgene(CG), Di-phosgene (DP) and Chloropicrin (PS).

(b) **Incapacitating Agents:** These agents cause temporary incapacitation of individuals. They affect the normal human body functioning for a short duration.

They are further classified as:-

(i) **Nose (Vomiting) Agents:** These cause irritation in the nose and throat, which can lead to vomiting.

(ii) **Mental Incapacitates:** These cause temporary mental disturbances, usually preceded or accompanied by physical effects.

(iii) **Physical Incapacitates:** These cause temporary effects such as fainting or paralysis, unaccompanied by mental effects.

(c) **Riot Control Agents:** Agents selected and approved for use when giving aid to the civil power and in similar operations. These are mostly the incapacitating agents such as CS. These are also referred to as 'tear' agents. These cause irritation of the eyes, flow of tears and a stinging sensation.

Note

Intext Questions   14.1

1. Fill in the blanks.

    (a) The criteria used to classify the chemical agents are _____, _____ and _____.

    (b) _____ agents are used when giving aid to the civil power and in similar operations.

    (c) From the point of view of duration of effect, the agents may be classified as _____ and _____.

    (d) The most dangerous of the lethal chemical agents are the _____ agents.

    (e) _____ agents cause inflammation, blistering of the skin and superficial destruction of contaminated internal tissue, e.g., the lining of the breathing passage.

2. Differentiate between persistent and non-persistent chemical agents.

14.5 Characteristics of Agents

The main groups i.e., the Nerve, Blister, Blood, Choking and Incapacitating (Vomiting Agent) are discussed in the succeeding paragraphs.

I. **Nerve Agents:** The most dangerous of the lethal chemical agents are the nerve agents. These act in the body by blocking the enzyme system, which is concerned with the nervous control of the brain. The known agents are classified as either V (Persistent) or G (non-persistent) agents.

(a) **V Agents:** The persistent nerve V agents are colourless and relatively in

volatile liquids, which slowly emit an odorless toxic vapour. Their viscosity is same as that of a light lubricating oil and their persistency is such as to make them extremely hazardous as a liquid or as an aerosol, which can be inhaled, absorbed through the skin or swallowed with contaminated food or water. The standard persistent agent is VX.

(b) **G Agents:** The non-persistent G agents, which are also colourless and odorless, are in contrast to the V agents, highly volatile and they vaporize rapidly to form a highly toxic cloud. Their viscosity is somewhat same as that of petrol and their volatility makes them generally unsuitable for dissemination in liquid or aerosol form. They are therefore diffused as vapours, which attack through the eyes and respiratory tract, but may also penetrate normal clothing to attack through the skin. Although vapour is the most likely hazard, liquid G Agents coming directly in contact with the skin are also lethal. The standard non-persistent agent is GB.

(c) **Symptoms of Nerve Agent Poisoning;** The order of the onset of the symptoms of nerve agent poisoning varies with the type of attack. With vapours, dimness of vision with pinpointed pupil occurs early; when absorbed through the skin, nausea and vomiting occur in the early stages. Later, irrespective of type of attack and unless preventive measures are taken, convulsions and paralysis set in, followed by eventual death. Following large doses, death may occur within minutes.

II. **Blister Agents:** Mustard (HD) is used as the principal blister agent.It gives off an invisible vapour having a slight but characteristic odour of garlic. Mustard (HD) can be used in liquid or vapour form. It can seriously damage the eyes, respiratory passage and skin if these are unprotected. Liquid mustard will penetrate normal clothing in a few minutes; vapour takes considerably longer time. Liquid mustard on the skin causes large blisters after about eight hours, whereas the vapour causes small blisters in the form of a rash, which takes much longer, sometimes even days to develop. Internal injuries will also result due to the consumption of contaminated food and drink. Mustard in field concentrations is normally lethal and a high casualty producer. It is normally disseminated as a liquid or aerosol and attacks through both the skin and the respiratory tract.

Symptoms of Blister Agents :

These vary with time and are described below: -

(a)   In the 20-60 minutes after exposure, nausea, vomiting and burning and watering of the eye have occasionally been observed.

(b)   In the next two to six hours, nausea, vomiting, headache, inflammation of

the eyes, excessive watering from the eyes, reddening of face and neck, soreness of throat, increase in pulse and respiration are observed.

(c)   After 24 hours of exposure, there is a general increase in severity of above effects. Inflammation of inner thighs, axilla, genitalia, tocks, followed by onset of blister formation - blisters are large, filled with yellow fluid and may be pendulous.

(d)   After 48 hours, the blistering becomes more marked. Swelling of genitalia, bronchitis, expectoration of mucous and dead cells with increased temperature is observed.

III.   **Blood Agents:** Blood agents are mostly used as vapours and the usual entry route is through the respiratory system. They produce their effects by interfering with some of the vital body functions. In the liquid form the skin can absorb them. Hydrocyanic Acid (AC) and Cyanogen Chloride (CK) are the important agents in this group. Blood agents affect the respiratory system causing inflammatory changes leading to pulmonary edema and stop of breath besides local effects such as irritation of the eyes.

Symptoms of Blood Agents :Inhalation of AC or CK in sufficient quantity may produce symptoms within seconds and death within minutes. Acute poisoning is characterized by: -

(a)   Dizziness.

(b)   Headache.

(c)   Palpitation.

(d)   Anxiety.

(e)   Ataxia, paralysis and coma.

(f)   Cardiovascular collapse, respiratory arrest, convulsions and metabolic acidosis are seen in severe cases.

IV.   **Choking Agents:** These are chemical agents, which attack the lung tissues causing pulmonary edema. The most common choking agent is Phosgene, which is a non-persistent chemical agent. It is a colourless gas with a suffocating odour reminiscent of moldy hay. Phosgene is rapidly hydrolysed in water leading to the formation of hydrochloric acid, which is corrosive, affects lung tissues and damages the capillaries. This is followed by seepage of fluid into the air sacs, leading to pulmonary edema.

Symptoms of Choking Agents:

The symptoms are delayed and initially no symptoms are observed for two to

three hours. The effects of agent start showing as follows: -

(a)   A mild irritation of eyes (lachrymation)

(b)   Soreness in the throat.

(c)   Coughing, tightness of chest.

(d)   Nausea, vomiting and headache.

(e)   There is a symptomless period before pulmonary odema sets, which is indicated by: -

(i)   Uneasiness, cough with white and yellow sputum.

(ii)   Nausea, vomiting, gastric pain.

(iii)   Rapid breathing and cardiac failure.

(f)   The victim collapses and suffers spasmodic convulsions. Severe cases show unconsciousness followed by death.

14.6 Protective Measures against Nerve Agents, Blister Agents, Blood Agents and Choking Agents

The respirator gives complete protection to the eyes, nose, throat and lungs against the vapour. Holding the breath till the mask is donned is also effective. The IPE/PPE made up of non-permeable material provides some amount of protection against entry through the skin. If contaminated by the liquid, one can avoid becoming a casualty by carrying out personal decontamination drill. Decontamination of affected equipment or ground by weathering is a slow process and so chemical decontaminants should be used.

I.   **Incapacitating Agent:** The non-lethal, incapacitating psycho-chemicals produce physical or mental effects of sufficient severity, to prevent men from carrying out their normal tasks. The duration of effect could be as brief as several minutes, although it could last for several days in certain cases. Recovery is complete and there are normally no after effects. The respirator affords full protection against the incapacitating agents.

II.   **Riot Control Agents:** CS Agent is mostly used as the riot control agent. It is a white crystalline solid, which is disseminated as an aerosol. This causes intense irritation of the eyes, accompanied by copious tears, a stinging of the skin and a burning sensation in the throat and lungs, with pain and difficulty in breathing in more severe cases. The effects are immediate and although they disappear rapidly in fresh air. CS agent attacks through the eyes and respiratory tract, but is a truly non-lethal agent. The respirator or gas mask provides complete protection against such agents.

14.6.1 Mode of Delivery of Chemical Agents

The CW agents may be disseminated in one or more of the following forms: -

(a)   Liquid droplets or spray, like rain.

(b)   Liquid aerosols, like a fine mist, small enough to be inhaled.

(c)   Very small particles of solids, like smoke.

(d)   Vapour or true gas.

14.7 Requirements of a Good Chemical Warfare Agent

A CW Agent must possess following requirements to be effective:-

(a)   High Toxicity: The extent to which a chemical agent affects a person depends upon the toxicity of the agent and the time to which he is exposed. Hence a suitable chemical agent must have high toxicity. It must also, preferably, affect more than one organ of the human body simultaneously.

(b)   Quick toAct: Since the degree of injury also depends upon the time of exposure, the agent must not only be highly toxic but should also be fast acting.

(c)   Non-perceptible to Human Senses: The target population must not realise that they have been subjected to a chemical attack.

(d)   Non-availability of Antidote: The enemy should not have an effective antidote.

(e)   Controllable Dissemination: The agent should be capable of being delivered by more than one delivery system and disseminated at the target in more ways than one, on target or off target, in vapour or aerosol form.

(f)   Volatility and Persistency: Highly volatile agents are generally non- persistent. If persistent agents are required, the chemical must not be volatile.

(g)   Capacity to Penetrate: It should enter the human body through inhalation or skin ingestion.

(h)   Non-detectable: It must be difficult to detect.

(j)   Availability of raw materials and economy and ease of manufacture.

(l)   Stability in storage.

(m)   Purity: The final product must be a pure substance since impurities would degrade its effectiveness.

(n)   Detonation Stability: The agent must not be destroyed by the heat and blast of detonation.

(o) **Suitable Vapour Pressure:** The chemical must be capable of being released at high pressure.

(p) **Ability to be Aerosolized:** Aerosols are very fine droplets in the air, small enough to be inhaled or to penetrate through clothing and skin.

(q) **Miscibility and Solubility:** Miscibility is the ability of an agent to be mixed with other compounds whereas solubility denotes its ability to be dissolved for the preparation of a solution.

Intext Questions 14.2

1. What are the protective measures against the CW agents? Suggest any three measures.

2. Mention any five basic requirements of a good chemical warfare agent.

3. Write two symptoms each of blood agents and choking agents.

ACTIVITY 14.1

Watch the "Chemical Warfare: Nerve Agents 1964 US Army Training Film" at https://www.youtube.com/watch?v=vsfUEgoFA6o.

What You Have Learnt

In this lesson you have learnt about the term Chemical Warfare. Important points of the lesson are as follows:-

• The science behind chemical agents wherein, types of Chemical Agents, Characteristics and Effects were analysed;

• The military use of the chemical agents in which, the military classification, duration of eeffectiveness and their classification based on Effectiveness;

• Effects on the body when agents such as Blister agent, Nerve agents come in contact with the human body and protective measures to be taken;

• The military requirements of a chemical warfare agent and the mode of delivery.

Terminal Exercises

1. Write short notes on

    (a)   Persistent and Non Persistent Agents

    (b)   Incapacitating Agent

    (c)   Nerve Agent

    (d)   Riot control Agents

2. Explain the factors that affect the duration of effectiveness of a chemical agent.

3. What are the modes of delivery of chemical agents?

4. What are the symptoms if Blister agents are used?

5. Classify the killer agents on the basis of their action and effect. Also give examples of each.

Answers to Intext Questions

14.1

1.   (a)   Military use, Duration of effectiveness and Effects on the body.

    (b)   Riot control Agents

    (c)   Non-Persistent Agents and Persistent Agent.

    (d)   Nerve agents.

    (e)   Blister agents

2.   Persistent agents continue to remain in the area for a long time. They are hazardous when touched. Non persistent agents disperse quickly and are effective only for a short duration of time.

14.2

1.   Gas Mask or Respirator, Protective clothing and personal Decontamination.

2.   (a)   High toxity

    (b)   Quick to act

    (c)   Capacity to penetrate

    (d)   Detonation stability

Note

(e)   Miscibility and solubility

3.   (a)   Blood Agents: Dizziness, headache, palpitation, anxiety

(b)   Choking Agents: A mild irritation of eyes, coughing tightness of chest, soarness in the throat, vomiting & headache

15

CYBER WARFARE

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In the last three lessons we have learnt about Nuclear, Biological and Chemical Warfares. With the advent of information technology and increased use of cyber space there is a new form of warfare that is being extensively used by adversaries and that is cyber warfare.

Cyber war relates to the use of computer technology to disrupt the activities of a state or organization. It is the deliberate attacking of information systems for strategic or military purposes. It implies disrupting or destroying information and communication system of an adversary, and trying to know everything about an adversary, while keeping the adversary from knowing much about oneself.

Cyber warfare involves both offensive and defensive operations pertaining to the threat of cyber attacks, for espionage and sabotage. There has been controversy over whether such activities can be called "war". Nevertheless, nations have been developing their capabilities and engaged in cyber warfare either as an aggressor or defendant, or both.

Objectives

After studying this lesson, you will be able to:

- explain the definition of Cyber Warfare;
- recognise the types of cyber threats;
- describe the types of cybercrime, cyber attackers and cyber weapons;
- explain cyber penetration and the remedial measures to be taken and
- explain the cyber security policy.

15.1 Definition of Cyber warfare

Cyber warfare has been defined as "actions by a nation-state to penetrate another nation's computers or networks for the purposes of causing damage or disruption". Other definitions also include non-state actors, such as terrorist groups, companies,

political or ideological extremist groups, hacktivists, and transnational criminal organizations. Some governments have made it an integral part of their overall military strategy, with some having invested heavily in cyber warfare capabilities.

Cyber warfare is essentially a formalized version of penetration testing in which a government entity has established it as a warfighting capability. This capability uses the same set of penetration testing methodologies but applies them in a strategical way to

(a)   Prevent cyber-attacks against critical infrastructure

(b)   Reduce national vulnerability to cyber attacks

(c)   Minimize damage and recovery time from cyber attacks

Offensive operations are also part of these national level strategies for officially declared wars as well as non contact war even when nations are not at war.

Cyber Crime: A crime committed where the use or knowledge of computer is required to cause damage is Cyber Crime.

Cyber Security: Cyber Security is the evolution of policies and procedures to protect own information and information system.

15.2 Types of Threat

(a)   Cyber attacks: These are the intrusions where immediate damage or disruption caused are the main concern.

(b)   Cyber Espionage: Cyber espionage is an act of intrusion which can provide the information needed . Traditional espionage is not an act of war, nor is cyber-espionage, and both are generally assumed to be ongoing between major powers. Despite this assumption, some incidents can cause serious tensions between nations and are often described as "attacks". For example

(i)   Massive spying by the US on many countries, revealed by Edward Snowden.

(ii)   After the NSA's spying on Germany's Chancellor Angela Merkel was revealed, the Chancellor compared the NSA with the Stasi (the official state security service of the German Democratic Republic).

(iii)   The NSA recording nearly every cell phone conversation in the Bahamas, without the Bahamian government's permission, and similar programs in Kenya, the Philippines, Mexico and Afghanistan.

(iv)   The "Titan Rain" probes American defence contractors computer systems since 2003.

(v)   The Office of Personnel Management data breach, in the US, widely attributed to China.

(c) Cyber Sabotage: Computers and satellites that coordinate other activities are vulnerable components of a system and could lead to the disruption of equipment. Compromise of military systems, such as command and control systems could lead to their interception or malicious replacement. Power, water, fuel, communications, and transportation infrastructure all may be vulnerable to disruption. The civilian realm is also at risk, some potential targets include the electric power grid, trains, or the stock exchanges. Non-state actors can play as large a part in the cyberwar space as state actors, which lead to dangerous, sometimes disastrous, consequences. Small groups of highly skilled malware developers are able to as effectively impact global politics and cyber warfare as large governmental agencies.

(d) Cyber Propaganda: The aim of propaganda is to control information and influence public opinion. Cyber propaganda is an effort to control information in whatever form it takes, and influence public opinion. It is a form of psychological warfare, except it uses social media, fake news websites and other digital means. Propaganda is the deliberate, systematic attempt to shape perceptions, manipulate cognitions, and direct behavior to achieve a response that furthers the desired intent of the propagandist.

The internet is a phenomenal means of communication. People can get their message across to a huge audience. Terrorist organizations use this medium to effectively to brainwash people and also recreist potential members.

Intext Questions   15.1

1. Fill in the blanks.

   (a) _____ is the evolution of policies and procedures to protect own information and information system.

   (b) The aim of _____ is to control information and influence public opinion.

2. Define cyber warfare.

3. What is meant by Cyber Crime and Cyber Security?

4. Mention the types of cyber threats.

15.3 Cyber crime, Cyber Attackers and Cyber Weapons

15.3.1. Emergence of Cyber Crime

Let's take a look at the causes and how Cyber Crime emerges:-

(a) In this world of network centric environment there has been a phenomenal growth

of internet usage; this has made our cyber space vulnerable to various crimes.

(b) Advancement in the field of electronics and technology has made common the use of sophisticated computer tools not only for us but also for our adversaries.

(c) There is a tendency where victims of cyber crimes hesitate to own upto attacks. This may be to prevent spread of rumours or damage to their reputations eg. banks etc.

(d) We are dramatically becoming more and more dependent on ecommerce and networked based solutions to optimise our resources; this in turn has made us vulnerable to cybercrime.

15.3.2 Types of Cyber Crime

In todays world there are as many cyber crimes as man's fertile and imaginative brain can think of Cybercrimes can broadly be categorised as:

(a) **Fraud and Forgery:** This is primarily evident in the field of commerce and economy.

(b) **Damage to or Modification of Computer Data or Programme:** This can be for private sector, public sector or for defence establish, such as ATC & Radar system.

(c) **Unauthorised Access to Computer System and Surveillance:** This is commonly seen in commercial websites, e.g., Phishing, spywares and data spoofing.

(d) **Unauthorised Reproduction of Computer Programmes:** These are the cases of piracy.

15.3.3 Cyber Attacker

Cyber attacker aims at causing criminal threats or to cause national security threats. Some cyber attackers are -

(a) **Hacker:** A computer user who intends to gain unauthorised access to a computer system.

(b) **Crackers:** A cracker is a hacker with criminal intent, who maliciously sabotages computers, steals information located on secure computers and cause disruption to the networks for personal or political motives.

(c) **Insider:** A disgruntled insider (a current or former employee) of an organisation is one of the principal sources of cybercrime. An insider's knowledge of the organisation's network often allows them to gain unrestricted access to cause damage to the information system or to steal sensitive data.

(d) **Terrorist:** Cyber attackers who use IT and internet to plan & execute their

activities, raise funds, spread propaganda, shut down critical national infrastructures (such as energy, transportation or government operations) for the purpose of forcing or intimidating a government or civil population.

(e) **Foreign Intelligence Services:** Foreign intelligence surveillance who use cyber tools as part of their espionage tradecraft for acquiring sensitive information about their adversary.

15.3.4 Cyber Weapons

So far, you have understood what is cybercrime. But just as in all other crimes, there are certain weapons used to commit these crimes. Let us find out what they are.

(a) **Viruses and Worms:** It is very commonly heard or noticed term in our day to day computer life. These are the codes that execute within host program. Whenever anything goes wrong we don't hesitate to blame viruses for the matter. But something more complex like Worms (programs executed independently) are also used.

(b) **Trojan Horses:** These are programs that work in disguise. Trojan Horses are unauthenticated program contained in a legitimate program which performs functions unknown to the user. Likely places for Trojan Horses to attack are:-

(i) OS.

(ii) Software downloaded from internet.

(c) **Logic /Knowledge Bombs:** These are hidden functions that becomes active when triggered.

(d) **Knobots:** Also known as Knowledge Robots, they keep the processed data and keep storing the knowledge.

(e) **Adware:** Adware is a programme that can be embedded within useful programmes. These popup while using the computer they are embedded in and have a lot of nuisance value.

(f) **Spyware:** Spyware is also a programme that is embedded with a useful programme. However, they are generally programmed to collect information such as user's web surfing habit /preferences and e-mail. The illegal part of the activity is that all the activity occurs without the users consent.

Intext Questions **15.2**

1. Fill in the blanks.

   (a) Knowledge Robots are known as_____.

   (b) Computer user who intends to gain unauthorised access to a computer

system is a _____.

(c) A _____is a hacker with criminal intent, who maliciously sabotage computer, steal information located on secure computers.

(d) _____ are programs that work in disguise.

(e) Adware and spyware are one and the same (True/False)

2. Mention the types of cybercrime.

3. List the various types of cyber weapons.

15.4 Cyber Penetration, Remedial Measures & National Cyber Security Policy

15.5.1 Cyber Penetration : Modus Operandi

How do our adversaries operate to penetrate into our Cyber Space? They send out numerous e- mails to internet users for cyber hacking. Generally these mails have spywares which are detrimental to the host computers and result in sharing /retrieval of data stored on the hard disk. Sometimes it also leads to crashing the computer. These spywares could facilitate remote administration of the host computer.

Whenever a hacker penetrates a computer, he would attempt to install a spyware that will give him access to that computer at his will. He also may install malicious programme which would collect information from the computer and through internet, down load all files and particular IP address. An antivirus programme alone is not good enough to detect all such rogue programs, because while viruses are designed to propagate openly, spywares are designed to propagate by stealth. So the technologies required to detect viruses and spyware are also different.

15.5.2 Indications

How can I get indication that my computer is Infected? There are very apparent indications which show your computer is infected. Be vigilant and look for the following:

(a) Poor system performance.

(b) Abnormal system behaviour e.g., system restarts or hangs frequently.

(c) Unknown services are running.

(d) Crashing of applications.

(e) Change in file extensions or contents.

(f) Hard Disk is busy or its light glows continuously.

15.5.3 Remedial Measures

Although you may not be able to catch the indications of your computer being infected, there are certain precautions you can observe to keep your systems safe from attack. These are -

(a) **Install Latest Patches for OS:** Install latest patches for the OS and application being used from a trusted website only. A good Firewall would act as the first line of defence to alert the user if any application / programme is trying to connect to his PC over the internet. However, a firewall has the following limitations:-

  (i) It cannot protect your computer against malicious insiders i.e., spoofing attacks.

  (ii) It cannot protect against connections that don't go through OS (i.e., backdoors).

  (iii) It cannot protect against viruses which are e-mail borne.

(b) **Install a Good Internet Security Suite:** Nowadays various Internet security suites are available in the market. They combine the functionality of antivirus, antispyware, firewall, parental controls etc. Alternately, as a user, you must install an antivirus as well as an antispyware programme and must download latest virus signature periodically (preferably daily).

15.5 CERT and National Cyber Security Policy

The Department of Information Technology created the Indian Computer Emergency Response Team (CERT-In) in 2004 to thwart cyber-attacks in India. That year, there were 23 reported cyber security breaches. In 2011, there were 13,301. In response, the government created a new subdivision, the National Critical Information Infrastructure Protection Centre (NCIIPC) to thwart attacks against energy, transport, banking, telecom, defence, space and other sensitive areas. India had no cyber security policy before 2013. The government unveiled a National Cyber Security Policy 2013 on 2nd July 2013. The National Cyber Security Policy is a policy framework by Department of Electronics and Information Technology.

The Cyber Security Policy aims at protection of information infrastructure in cyberspace, reduce vulnerabilities, build capabilities to prevent and respond to cyber threats and minimize damage from cyber incidents. This is achieved through a combination of institutional structures, people, process, technology and cooperation. The objective of this policy is to create a secure cyberspace ecosystem and strengthen the regulatory framework.

The Computer Emergency Response Team (CERT-In) has been designated to act as

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Warfare and Its Types

Note

a nodal agency for coordination of crisis management efforts. CERT-In also acts as an umbrella organization for coordination actions and operationalization of sectoral CERTs.

Intext Questions 15.3

1. Expand the following-

    (a) CERT

    (b) ICT

    (c) NCIIPC

2. What are the indications of the computer system being infected?

3. What are the limitations of firewall?

4. Why is a good firewall called the first line of defence?

ACTIVITY 15.1

Watch the documentary "Zero Days" at https://topdocumentaryfilms.com/zero-days/

What You Have Learnt

This lesson in Cyber warfare has given you an insight into the following:

- Certain definitions connected with cyber warfare;

- Types of threat which include cyber espionage, cyber attack and cyber sabotage and cyber propaganda;

- You have also studied about types of Cybercrime, Cyber Attackers and Cyber Weapons

- Cyber Penetration and indication that give us an idea that our computer is infected. Remedial measures have to be under taken to prevent cyber attacks.

Terminal Exercises

1. Write short notes on

    (a) Cyberwarfare.

    (b) Cyber Espionage.

    (c) Cyber Sabotage.

    (d) CERT and National Cyber Security Policy.

    (e) Remedial measures against cyber penetration.

2.   Differentiate between adware and spyware.

3.   What is cyber propaganda?

4.   Explain the emergence of cybercrimes and measures to check them.

5.   Explain the National Cyber Security Policy.

Answers to Intext Questions

Note

15.1

1.   (a)   Cyber Security.

(b)   Propaganda

2.   Cyber warfare has been defined "actions by a nation-state to penetrate another nations computers or network of or the purpose of causing damage or destruction.

3.   Cyber crime is committed where the use or knowledge of computer is required to cause damage.

4.   (i)   Cyber attacks

(ii)   Cyber espionage

(iii)   Cyber sabotage

(iv)   Cyber propaganda

15.2

1.   (a)   Knobots.

(b)   Hacker.

(c)   Cracker

(d)   Trojan Horses.

(e)   False

2.   (i)   Fraud and Forgery

(ii)   Damage to or modification of computer

3.   Viruses and Worms, Trojan Horses, Logic/Knowledge Bomb, Knobots, Adware, Spyware.

15.3

1.   (a)   Computer Emergency Response Team (CERT)

(b)   Information and Communication Technology (ICT)

(c)   National Critical Information Infrastructure Protection Centre (NCIIPC)

2.   (a)   Poor system performance.

    (b)   Abnormal system behaviour e.g., system restarts or hangs frequently.

    (c)   Unknown services are running.

    (d)   Crashing of applications.

    (e)   Change in file extensions or contents.

    (f)   Hard Disk is busy or its light glows continuously.

3.   (i)   It cannot protect your computer against malicious insiders i.e., spoofing attacks.

    (ii)   It cannot protect against connections that don't go through OS (i.e., backdoors).

    (iii)   It cannot protect against viruses which are e-mail borne.

4.   Because it alerts the user if any application/programme is trying to connect to her/his PC over the internet.

16

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ARMED FORCES IN PEACE KEEPING

In the previous module we have learnt about the non-conventional warfare and weapons of mass destruction. The Indian Armed forces, apart from its regular duties of protecting the nation from external threat, are also involved in various other duties. Some of them are peace keeping, humanitarian assistance and disaster relief, and aid to the local government in handling internal affairs.

Peace keeping refers to activities intended to create conditions that favour lasting peace in a war torn country. Peace keeping missions prevent the risk of renewed conflict. United Nation (UN) is the largest international organization that is committed to establishment of world peace. The peacekeepers monitor and observe peace processes in post-conflict areas. They may also assist ex-combatants in implementing peace agreement commitments that they have undertaken. Such assistance may come in many forms, including confidence-building measures, power-sharing arrangements, electoral support, strengthening the rule of law, and economic and social development. India is one of the largest troops contributor to the United Nations for peacekeeping missions.

Objectives

After studying this lesson, you will be able to:

- define peace keeping and types of peace keeping operations;

- appreciate the contents of the charter of UN peace keeping;

- explain the principles of peace keeping and

- describe the contribution of India Armed Forces in UN peace keeping.

16.1 Definition of Peace keeping Operations

" Peacekeeping" refers to activities intended to create conditions that favour lasting peace. Research has found that peacekeeping reduces civilian and battlefield deaths

Module - VI

Armed Forces and its Role in Internal Security

Note

and reduces the risk of renewed warfare. Peacekeeping by the United Nations is a role held by the Department of Peacekeeping Operations. Peacekeeping operations are defined as *"a unique and dynamic instrument developed by the organization as a way to help countries torn by conflict to create the conditions for lasting peace."*

It is distinguished from peacebuilding, peacemaking, and peace enforcement although the United Nations does acknowledge that all activities are "mutually reinforcing" and that overlap between them is frequent in practice.

16.1.1 Types of Peacekeeping Operations

There are various types of operations within peace keeping. The UN peacekeeping is governed by Chapter VI and Chapter VII of the UN Charter. Chapter VI missions are consent based, therefore they require the consent of the warring factions involved in order to operate. Should they lose that consent, Peacekeepers would be compelled to withdraw.

Chapter VII missions, by contrast, do not require consent, though they may have it. If consent is lost at any point, Chapter VII missions would not be required to withdraw. Chapter VII mission are peace enforcement missions.

Peace-Enforcement

Peace-enforcement meant to act with or without the consent of the belligerents in order to ensure any treaty or cease-fire mandated by the United Nations Security Council is maintained. This is done primarily under Chapter VII of the UN Charter and the forces are generally heavily armed as opposed to the unarmed, or lightly-armed personnel frequently deployed as observers.

Peace-Making

Peace-making intends to compel belligerents to seek a peaceful settlement for their differences via mediation and other forms of negotiation provided by the UN under Chapter VI of the UN Charter.

Peace-Keeping

Peace-keeping is deployment of a lightly-armed United Nations presence in the field with the consent of the belligerents involved in order to build confidence and monitor agreements between concerned parties. Additionally, diplomats continue to work toward comprehensive and lasting peace, or for the implementation of an agreed upon peace.

16.1.2 Post-Conflict Reconstruction

Post-Conflict Reconstruction is intended to develop economic and social cooperation to mend relations between the belligerents. Social, political, and economic infrastructure

would ideally prevent potential violence and conflict in the future and help to contribute to a lasting and robust peace.

Intext Questions   16.1

1.   Define Peace keeping.

2.   What is post conflict reconstruction?

3.   Fill in the blanks:

(i)   _____ is intended to develop economic and social cooperation.

(ii)   For peace enforcement, the forces are generally _____ as opposed to the frequently deployed forces as observers.

(iii)   Peace keeping force is deployed in order to _____ and _____ agreements.

16.2 The Charter of the United Nations Peace keeping

The Charter of the United Nations was signed in San Francisco on 26 June 1945 and is the foundation document for all United Nations work. The United Nations was established to "save succeeding generations from the scourge of war" and one of its main purposes is to maintain international peace and security. Peacekeeping, although not explicitly provided for in the Charter, has evolved into one of the main tools used by the United Nations to achieve this purpose.

The Charter gives the United Nations Security Council, a primary responsibility for the maintenance of international peace and security. To fulfill this responsibility, the Security Council may adopt a range of measures, including peacekeeping operations. The legal basis for such action is found in Chapters VI, VII and VIII of the Charter.

While Chapter VI deals with the "Pacific Settlement of Disputes", Chapter VII contains provisions related to "Action with Respect to the Peace, Breaches of the Peace and Acts of Aggression".

Chapter VIII of the Charter also provides for the involvement of regional arrangements and agencies in the maintenance of international peace and security. United Nations peacekeeping operations have traditionally been associated with Chapter VI.

In recent years, the Security Council has adopted the practice of invoking Chapter VII of the Charter when authorizing the deployment of United Nations peacekeeping operations into volatile post conflict settings where the State is unable to maintain security and public order. The Security Council's invocation of Chapter VII in these

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Armed Forces and its Role in Internal Security

Note

situations provide the legal basis for its action and can be seen as a statement of firm political resolve.

16.3 Principles of Peacekeeping

There are three basic principles that define UN peacekeeping operations. These three principles are inter-related and mutually reinforcing:

(a) **Consent of the Parties:** UN peacekeeping operations are deployed with the consent of the main parties to the conflict. This requires a commitment by the parties to a political process. Their acceptance of a peacekeeping operation provides the UN with the necessary freedom of action, both political and physical, to carry out its mandated tasks.

The fact that the main parties have given their consent to the deployment of a United Nations peacekeeping operation does not necessarily imply or guarantee that there will also be consent at the local level due to internal differences/conflicts.

(b) **Impartiality:** Impartiality is crucial to maintain the consent and cooperation of the main parties and should not be confused with neutrality or inactivity.

A mission should not shy away from a rigorous application of the principle of impartiality for fear of misinterpretation or retaliation. Failure to do so may undermine the peacekeeping operation's credibility and legitimacy. It may lead to a withdrawal of consent by one or more of the parties.

(c) **Non-Use of Force Except in Self-Defence and Defence of the Mandate:** UN peacekeeping operations are not an enforcement tool. However, they may use force at the tactical level, with the authorization of the Security Council, if acting in self-defence and defence of the mandate. The Security Council may also authorize the use of force by UN peacekeepers to deter forceful attempts to disrupt the political process, protect civilians under imminent threat of physical attack, and/or assist the national authorities in maintaining law and order.

A UN peacekeeping operation should only use force as a measure of last resort. It should always be calibrated in a precise, proportional and appropriate manner, within the principle of the minimum force necessary to achieve the desired effect. The various factors that decide the measure of force to be applied include mission capability; public perceptions; humanitarian impact; force protection; safety and security of personnel; and the effect that such action will have on national and local level.

Intext Questions **16.2**

1. Fill in the blanks.

Note

(a)   The legal basis for UN peacekeeping operations is found in chapter _____, _____ and _____ of the Charter.

(b)   The principles of UN peacekeeping are _____ and_____.

(c)   The three principles of UN peacekeeping are _____, _____ and _____.

2.   When and where was the Charter of UN signed?

3.   Mention any three factors that decide the measure of force to be applied in UN peacekeeping.

16.4 India Armed forces in UN Peacekeeping

As of 29 February 2016, 124 countries were contributing a total of 1,05,314 personnel to Peacekeeping Operations, with Ethiopia leading the tally (8,324), followed by India (7,695) and Bangladesh (7,525). So far India has taken part in 43 Peacekeeping missions with a total contribution exceeding 1,80,000 troops. Indian Peacekeepers have been lauded by the UN and host countries for their efforts in rebuilding the nations. The First Deployment of Indian Peacekeeping Operations was in the year 1950 in Korea.

16.4.1 Current Deployments

The Indian Armed Forces are currently undertaking the following UN Missions.

(a)   Lebanon (UNIFIL): One infantry battalion group, Level II Hospital comprising 650 peacekeepers from all ranks and 23 staff officers till date, have been deployed since Dec 1998. The current situation in the Mission is tense and volatile due to the crisis in Syria.

(b)   Congo (MONUSCO): Extended Chapter VII mandate with Augmented Infantry Brigade Group (four infantry battalions with level III Hospital), Army aviation contingent with utility helicopters along with a large number of military observers and SOs have been contributed since January 2005. In addition, two Formed Police Units (FPU) ex BSF and ITBP have also been deployed since 2009. MONUSCO's new mandate vide Resolution 2098 (2013) has been implemented with an Intervention Brigade provided by AU, deployed under UN Command.

(c)   Sudan and South Sudan (UNMIS/UNMISS): Two Infantry Battalion groups, sector HQ, Engineer company, signal company, Level-II Hospital and a large number of military observers and staff officers (SOs) have been deployed since April 2005. The latest political developments in the Mission led to widespread

inter-tribe violence and large displacement of locals. In the ensuing intra state conflict two Indian Peacekeepers lost their lives while ensuring protection of civilians. The current situation continues to be highly volatile.

(d) Golan Heights (UNDOF): A Logistics battalion with 190 personnel has been deployed to look after the logistics security of UNDOF since February 2006. Current crisis due to Syrian conflict has impacted the mission and exchange of fire between the Syrian Forces and the armed groups have put the Peacekeepers in grave danger.

(e) Ivory Coast (UNOCI): The mission has been supported by Indian staff officers (SOs) and military observers since its inception in April 2004.

(f) Haiti (MINUSTAH): Apart from three Indian Formed Police Unit (FPU) there, i.e. from CISF, CRPF and Assam Rifles, which have been successful, the mission has been supported by Indian Army staff officers since its inception in December 1997.

(g) Liberia (UNMIL): India has been contributing both male and female Formed Police Units from CRPF and its Specialized unit RAF in Liberia since April 2007. The Female Formed Police Unit (FPU) has especially become an inspiration for the women of the host nation and have become trendsetters for other such female FPUs across the globe.

Intext Questions 16.3

1. Fill in the blanks.

   (a) India has participated in _____ UN peacekeeping missions.

   (b) The first Indian UN deployment was in _____ in 1950 where India sent paramedical troops and custodian forces.

2. Name the countries where these UN missions are operating.

   (a) UNIFIL

   (b) UNDOF

   (c) MONUSCO

   (d) UNOCI

   (e) UNMIL

ACTIVITY 16.1

Watch the documentary "Special Program - Shanti keSainik: India's contribution to peacekeeping operations". Follow the link:-

https://www.youtube.com/watch?v=WpltI5UTc44

ACTIVITY 16.2

Watch the documentary "Blue Helmets in Congo: Indian peacekeepers tackle multiple hurdles". Follow the link:-

https://www.youtube.com/watch?v=J3w4DsCi9xU

What You Have Learnt

● In this lesson, you have learnt that peace keeping activities create conditions that favour lasting peace which is achieved through peace keeping operations.

● These operations aim at peace enforcement, peace making and peace keeping.

● Peace keep activities are carried out as per the charter if the United Nations - which is divided into 8 chapters.

● All the peace keeping operations are based on three principles (a) consent of the parties (b) impartiality (c) Non use of force except in self-defence and defence of the mandate. You have also come to know the contribution of Indian Armed Forces in the U.N. Peace keeping operations.

Terminal Exercises

1. Explain the three principles of UN peacekeeping.

2. Describe any three operations to show Indian contribution towards UN Peacekeeping.

3. What is the difference between peacemaking, peace keeping and peace enforcement operations? Explain.

Answers to Intext Questions

16.1

1. Peacekeeping refers to activities intended to create conditions that favour lasting peace

2. Post-Conflict Reconstruction is intended to develop economic and social cooperation meant to mend relations between the belligerents.

3. (i) Post-conflict reconstruction

Note

Note

   (ii)   Peace enforcement

   (iii) Build confidence and monitor

16.2

1.   (a)   Chapters VI, VII and VIII

   (b)   Inter-related and mutually reinforcing

   (c)   Consent of the Parties, Impartiality and Non-Use of Force Except in Self-Defence and Defence of the Mandate

2.   On 26th June 1945 at San Francisco

3.   (i)   Mission capability

   (ii)   Public Perception

   (iii) Huminitarian impact

   (iv) Force protection

   (v)   Safety and security of personnel

   (vi) Effect of the action

                               (any three factors)

16.3

1.   (a)   43

   (b)   Korea

2.   (a)   Lebanon

   (b)   Golan Heights

   (c)   Congo

   (d)   Ivory Coast

   (e)   Liberia

17

ARMED FORCES IN DISASTER MANAGEMENT

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The armed forces of India, have an important role to play in managing disasters especially providing relief to the affected people and restoring essential services like water, communication connectivity and power supply. You must be aware of natural disasters that have occurred in India. The Latur earthquake, floods in Chennai in 2015, Uttarakand floods of 2013, Tsunami in 2004, Kerala floods of 2018, etc. In all these incidents, the armed forces of India had a major role to play.

Though Armed Forces are principally involved in the security of the Nation against external threats, they are now being involved more and more in managing disasters with in the country and even in other countries in the neighbourhood. Their capability and capacity to respond quickly and efficiently and handle such situations make the armed forces the ideal choice as the first line of response.

Objectives

After studying this lesson, you will be able to:

• define disaster and the need for disaster management;

• appreciate the role of Indian Armed Forces in managing disasters;

• explain the compositions and function of NDMA and

• Practice do's and don'ts before and after cyclones.

17.1 What are Disasters

`Disasters' are occurrences that are sudden and cause huge destruction to humans, animals and environment. There are heavy losses that could be human, material,

economic or environmental. Disasters are classified as natural and man-made.

`Natural Disasters' are all hazards that occur in nature like earthquakes, landslides, volcanic eruptions, floods, tsunamis, and cyclones that result in the loss of human life as well as destruction of property. Man-made disasters occur due to human action or inaction. These could be industrial accidents, transport accidents, oil spills, nuclear explosions, fire or stampedes.

- **Natural Disasters**
  - Earthquakes;
  - Floods; Urban floods;
  - Cyclones;
  - Landslides;
  - Tsunamis;
  - Heat wave.

- **Manmade Disasters**
  - Nuclear, Biological and Chemical;
  - Oil Spills in oceans;
  - Pollution

17.1.1 Disaster Management

Since natural phenomena cannot be averted, the effects alone can be managed. The loss of lives can be reduced and normal life can be restored. This is the process of disaster management. The natural disasters result in loss of homes, cattle, human lives and destruction of property.

So, the first task is to arrange for relief supplies like food, clothing and medicines to reach the affected people. Search and rescue of missing persons or animals is also part of managing disasters. Since natural disasters also severely damage infrastructure like roads, bridges, railway lines and power supply restoration of these is a principal task of disaster management teams.

17.2 Armed Forces in Disaster Management

In India the Armed Forces are the first responder when disaster occurs. They have equipment, training and a professional response to any situation. The lack of a civil defense system is also a reason for the dependence on the armed forces in times of calamity. Some specific disasters like oil spills, nuclear accidents require special equipment and training.

The armed forces possess capabilities like airlift or the ability to carry large number of men and material to any place across the country. Their expertise in the field of search and rescue is unmatched. The armed forces can also bring in equipment for repairing damaged roads or building makeshift bridges.

17.2.1 Examples of Disaster relief by Indian Armed Forces

The Armed Forces are the first responders to calls of disaster management. During the tsunami of 2004, Indian armed forces carried out one of the biggest peacetime relief operations. The armed forces helped victims not only within India but in other countries too, namely, Maldives, Sri Lanka, Indonesia. Using Naval ships, helicopters and aircraft Indian Navy supplied food, safe drinking water, medical facilities sanitation and shelter.

They also quickly restored water and power supply. The medical teams helped prevent epidemics and diseases.

- During Cyclone Wardha, Indian Navy moved supplies by ships to Chennai. Air dropping of food packets to the affected and airlifting of stranded and injured people was also undertaken.

- The neighbouring country of Nepal was severely affected by earthquake in April 2015 and the Indian Army was among the first to dispatch relief material and men to help the mountain nation tackle with the aftermath of the natural calamity. Operation Maitri was launched by Indian Army where large transport aircrafts, Mi 17 helicopters evacuated Indian and foreign citizens. Indian Air Force airlifted medical personnel, engineering teams, water, food, blankets and tents.

- In November-December 2017, Cyclone Ockhi which ravaged the coast of Kanyakumari as well as Kerala and Lakshadweep also saw the Indian Armed Forces responding. The Indian Navy transported four tonnes of food, water, blankets, raincoats and mosquito nets to the island of Lakshadweep. This included searching for missing fishermen and transporting relief supplies to the affected.

Even in the case of manmade disasters the armed forces have performed vital assistance. The accidental oil spill caused by tanker ships can be tackled by Armed Forces as they are trained and possess specialised equipment.

17.3 National Disaster Management Authority (NDMA)

India has an organisation called National Disaster Management Authority for managing disasters. They have response teams in every state as well as in the Centre. The response teams at the centre are called National Disaster Relief Force (NDRF). At the state level it is called State Disaster Relief Force (SDRF). The response teams are trained by armed forces.

Note

Fig 17.4 - NDMA EMBLEM

NDMA VISION

"To build a safer and disaster resilient India by a holistic, pro-active, technology driven and sustainable development strategy that involves all stakeholders and fosters a culture of prevention, preparedness and mitigation."

During Floods

Do's

Turn off power and gas connection; be alert for gas leaks.

Stay away from sewerage lines, gutters, drains, etc.

Evacuate low lying areas and move to safer places.

Stay away from electric poles and fallen power lines to avoid electrocution.

Drink boiled/chlorinated water.

Watch out for broken electric poles and wires, sharp objects and debris.
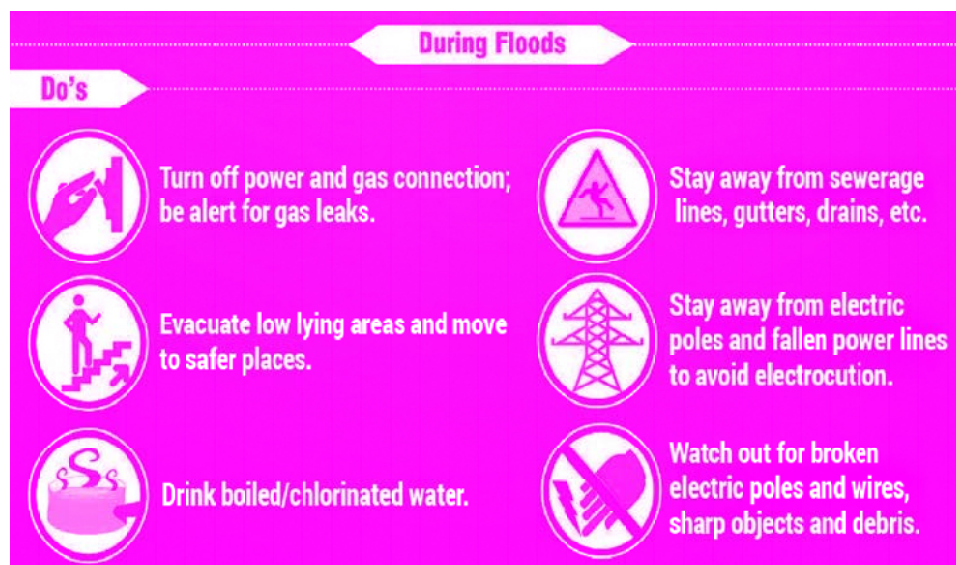
Fig 17.5 - Poster Issued by NDMA for Floods

Armed Forces in Disaster Management

17.4 Do's and Don'ts

1. BEFORE CYCLONE

- ⇒ Ignore rumours, Stay calm, Don't panic
- ⇒ Keep your mobile phones charged to ensure connectivity; use SMS
- ⇒ Listen to radio, watch TV, read newspapers for weather updates
- ⇒ Keep your documents and valuables in water-proof containers
- ⇒ Prepare an emergency kit with essential items for safety and survival
- ⇒ Secure your house; carry out repairs; don't leave sharp objects loose
- ⇒ Untie cattle/animals to ensure their safety

Fishermen Should

- ⇒ Keep a radio set with extra batteries handy
- ⇒ Keep boats/rafts tied up in a safe place
- ⇒ Don't venture out in the sea

2. DURING AND AFTER CYCLONE

A) If Indoors

- ⇒ Switch off electrical mains, gas supply
- ⇒ Keep doors and windows shut
- ⇒ If your house is unsafe, leave early before the onset of a cyclone
- ⇒ Listen to radio/transistor
- ⇒ Drink boiled/chlorinated water
- ⇒ Rely only on official warnings

B) If Outdoors

- ⇒ Do not enter damaged buildings
- ⇒ Watch out for broken electric poles and wires, and other sharp objects
- ⇒ Seek a safe shelter as soon as possible

Fig. 17.6 Poster Issued by NDMA for Cyclones

The organisational strength, discipline and response of the armed forces make them the most appropriate responder in times of crisis especially in disaster situations. Until the National Disaster Management Authority gains more experience and expertise in handling disaster management situations, the armed forces will continue to provide vital support and remain the bulwark of efforts at managing disasters in a vast country like India.

Intext Exercises   17.1

1. State whether the statements are True or False -

    a. Tsunami is a manmade disaster. T/F

    b. NDMA stands for National Danger Management Authority. T/F

    c. During floods one must switch off electricity and gas in the house. T/F

2. What characteristics of armed forces are best suited for managing disasters?

What You Have Learnt

- Disasters are occurences that are sudden and cause great harms to humans and animals.

- There are two types of disasters. Manmade and Natural disasters.

- You have also studied as how to manage disasters that affect the common people.

- The role played by The Indian Armed Forces in helping the people by carrying out various types of relief operations are a source of inspiration.

- India now has a NDMA and is developing resources and men required to carryout disaster relief operations all over India.

- At the centre there is NDRF and the states have SDRF.

- The Armed Forces of India have the capability and capacity to assist during any type of disasters and are the first choice for providing immediate relief.

- Do's and don'ts before, during and after a disaster are also very essential to know to tackle emergency situation.

Terminal Exercises

1. Explain the role of armed forces in managing disasters with the help of examples.

2. Using the examples as illustration how would you assess the ability of armed forces in disaster management?

3. What is the full form of NDMA? Describe its organisation and functioning.

4. Highlight any five things to be done before a cyclone and three things each during and after a cyclone.

Answers to Intext Questions

17.1

1. (a) False

   (b) False

   (c) True

2. Discipline, Training and Professional response.

18

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ARMED FORCES IN INTERNAL SECURITY

In the previous lesson you have studied the role of the Armed Forces during crisis like disaster management and peacekeeping operations. The armed forces also plays an important role in dealing with insurgensies / disturbance within the country. What you must understand is that when it comes to assessing the role of armed forces in protecting its respective nation from external threat it is generally common for all nations.

External threat is related to borders whereas internal threat is from the people of the country due to political, ideological reasons like left wing extremism etc. Maintainance of internal security in the responsibility of the Ministry of Home Affairs but Armed Forces are also called in when situation cannot be dealt by CRPF.

In this lesson we will specifically learn about the role of the Indian Armed Forces and the Indian intelligence agencies like the "Intelligence Bureau" (IB) and the " Research and Analysis Wing" (RAW), in the internal Security of India.

Objectives

After studying this lesson, you will be able to:

- appreciate and explain the role of Indian Armed Forces in internal security;

- know about the special forces tasked to protect India's strategic assets;

- explain the role of Indian Intelligence Agencies IB and RAW in India's internal securities.

18.1 Role of Indian Armed Forces

Our nation has faced the problem of insurgency and terrorism for many years. The state of Jammu & Kashmir (J & K), the Northeastern States are affected by insurgency and terrorism. As a result of the violence caused due to insurgency and terrorism in these regions, many civilians and security personnel have lost their lives.

Our armed forces are playing a very important role in the fight against the insurgents

and terrorists operating in the region and protecting India's citizens and its integrity. However, the dynamics of the Indian armed forces involvement in these operations are significantly different due to the nature of the origin of the insurgency in these specific regions.

Let us see the figure below to understand the dual role of the Indian Armed Forces in the fight against insurgency and terrorism.
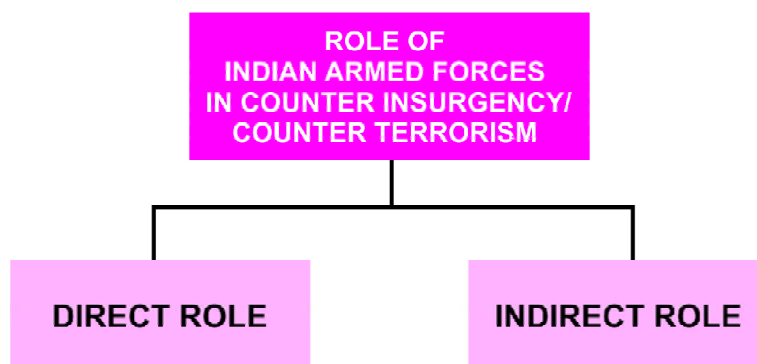
Fig 18.1 Dual Role Indian Armed Forces in Counter Insurgency/ Counter Terrorism

18.1.1 The Direct Role

The Indian Army has been playing a direct role in fighting insurgency and terrorism in J & K and the Northeastern States for decades. This is despite the fact that the Army is a force that is raised and trained primarily to protect India from external threat.

However, the reason for Army's direct involvement in these volatile regions is because there is enormous amount of external involvement in abetting and supporting the insurgency with the intent to cause social unrest in India. The situation is such that the CAPF can not maintain peace & deal with the insurgents. In J&K our hostile neighbour to the west i.e. Pakistan mainly instigates the problem of insurgency and terrorism.

For over three decades the terrorist operating in Kashmir are being provided direct assistance for their activities in J&K. Pakistan has organised terrorist camps situated in Pakistan Occupied Kashmir (POK). Pakistan provides following assistance to the terrorists:

* Training camps for newly recruited terrorists,

* Provide launchpads for carrying out terrorist attacks across the border on the Indian Soil.

* Terrorists are provided arms ammunition communication equipment for their operation in J&K.

Hence, for countering this menace of cross border terrorism in J& K the Army has been taked with bring peace to the state by reducing the violence.

As part of the direct involvement the Indian Army has raised a specialised counter insurgency force named Rashtriya Rifles (RR) which is specifically trained to carry out counter insurgency operations in the high altitude theatre of J &K.

In the Northeast a number of insurgent groups like the United Liberation Front of Assam (ULFA), National Democratic Front of Bodoland (NDFB) and the United National Liberation Front (UNLF) are carrying out their terrorist operations against the Indian establishments by operating across the porous border between India and Myanmar. These terrorist groups have their bases in Myanmar and receive their arms and ammunitions from various Southeast Asian nations.

The border is very difficult to be fenced mainly due to its geographic terrain which consists of mountains, valleys and dense forests. Hence the insurgent groups easily move in and out of India to carry out their terrorist activity. Due to the nature of the border it makes the task of the Indian security forces to patrol and secure the borders extremely difficult.

Assam Rifles

Similar to the Rashtriya Rifles in J & K, in the Northeastern States the Assam Rifles is the specialised force that carries out anti- insurgency operations in difficult terrain of the region. The Assam Rifles raised as Cachar Levy in 1835 is the oldest Central Para Military Force in India. The Force was raised mainly to guard the alluvial plains of Assam from the wild and unruly tribes inhabiting the surrounding hill tracts. This was the earliest embodied unit of what eventually developed into the Assam Rifles.

The Force is a potent organization with 46 battalions and its associated command and administrative back up. It is designated by the GoM committee as the Border Guarding Force for the Indo - Myanmar border and is also its lead intelligence agency. Look at the logo of the Assam Rifles given below.

Fig.18.2 Assam Rifles Logo

So, what functions does the Assam Rifles perform? Some of the specialist functions are -

Note

- Conduct counter insurgency operations in the north-east and other areas where deemed necessary, under control of the army.

- During peace and 'proxy war', ensure security of the indo-china and indo-myanmar borders.

- During war, rear area security in the area. Act as penultimate interventionist force of the central government in internal security situation, under the control of army; when the situation goes beyond the control of central paramilitary operations.

Q Intext Questions **18.1**

1. Fill in the Blanks:

   (a) The name of specialised counter-insurgency force of the Indian Army in the State of J&K is _____

   (b) The oldest paramilitary force of India comprised fully of Army personnel operating in the Northeastern States is _____

   (c) The Insurgents of the Northeastern States make use of _____ International border to carry out their insurgency activities against the Indian Government.

18.1.2 The Indirect Role

So far we have seen that the Indian Army is playing a direct role in the fight against insurgency and terrorism in J & K and the Northeastern States due to the complex role of external involvement in the nature of the security threat there. However the nature of the security threat in Central India posed by the Naxalite insurgents is very different from that of the situation in the J&K and the Northeast.

The cause of insurgency in Central India is mainly due to the socio-economic problem in the tribal belt of India. The people who are the perpetrators of Naxal insurgency are essentially misled Indians who are lured into carrying arms against the Indian establishments to create a communist government.

Despite the fact that the Naxals are carrying out a violent armed struggle against the Indian establishment and population for decades, the Indian Government has steadfastly refrained from using its Armed Forces directly against the Naxalites. We must understand the fundamental reasons for this. This is due to two factors, namely

- First, the perpetrators of the Naxal insurgency are politically misguided Indians from poor socio-economic background in the tribal belt of India.

- Second, it is a fact that it is taking place in Central India away from our nation's boundary, which reduces the chances for hostile external factors utilizing the Naxal problem as an opportunity to create national security problems for India.

We must understand from the above factors that the Indian Armed Forces which has the fundamental objective of protecting India and its citizens against external threats are not tasked to carry out anti-naxal operations as it would mean that the Indian Government is using armed forces against its own citizen.

However, the Naxals are armed and therefore require force to stop them. The Government of India is primarily using its paramilitary force Central Reserve Police Force (CRPF) and the state police of the respective naxal infested States in Central India. So far the Indian Armed Forces have played an indirect role in the fight against Naxalism. Let us see those indirect roles that the Indian Armed Forces is currently playing to fight the naxalites:

- The Indian Army trains the CRPF commandos in the Art of jungle warfare and to defuse the Improvised Explosive Devices (IED) that are predominantly used by the Naxalites in their attacks against the security forces.

- The Indian Air Force (IAF) has employed its helicopters to carry out immediate medical evacuation of wounded paramilitary soldiers from the naxal insurgency hit areas where counter-insurgency operations are taking place. Over the recent years the IAF transport helicopters, the Mi-17 have also been used to transport the paramilitary troops fighting the Naxalitis.

Apart from this, the IAF has also used its unmanned aircrafts to carry out aerial reconnaissance of the Naxal movement and shared the information with the CRPF commandos carrying out operations on the ground.

18.1.3 Protecting India's Strategic Assets

Another important task of the Indian Armed forces in India's internal security protection of India's strategic assets. Before go to the role of Indian Armed Forces in the protection of the strategic assets of India, we must know what are strategic assets of a nation.

The term 'strategic assets of a nation' denotes the important military and civilian infrastructures, which are essential for a nation's security, technological advancement and economic growth.

The strategic assets of India include the following:-

- Military Bases
- Ports and airports
- Oil refineries

- Nuclear power plants

- National capital - Parliament

- Important bridges across major rivers

- Dams - example BhakraNangal dam

- Offshore oil rigs

These infrastructures are also very essential for the three wings the Armed Forces to operate during wartime. Assets like naval ports and airbases are the most vulnerable because terrorists and other hostile forces may attempt to sabotage them as our powerful warships and aircrafts are the most vulnerable while they are on their respective bases.

The 2016 Pathankot airbase attack is an important example on how the terrorist groups may target an important strategic asset of India. Hence it is the vital duty of the our armed forces to protect their respective strategic assets.

18.2   Special Forces

What the specific divisions of the armed forces that are specially tasked to protect India's strategic assets? These are -

- **The National Security Guard (NSG)** is a special forces unit which derives its manpower from the Indian Army. The primary task of the NSG is to combat terrorism in order to protect states against internal disturbances. The NSG engages in important internal security operations like rescuing hostages from terrorist attacks such as hijacking and eliminating the terrorists who carry out these attacks. You can find many instances where the NSG has performed a brilliant role in rescuing hostages from terrorist attacks.

- **The `MARCOS'** is also a special forces units of the Indian Navy. It is specially tasked to protect the important naval assets and bases. They also engage in conducting amphibious operations against terrorists and antipiracy operations. They are the Navy's version of NSG.

  The MARCOS commandos played a vital role during the 2008 Mumbai attacks along with the NSG. MARCOS play an active role in the counter-terrorist operations in J & K.

- **The Garud Commando Force** is the Special Forces unit of the IAF and equivalent to its counterparts in the Army and Navy, which are NSG and MARCOS respectively.

  The most important task of the Garud Commando Force is to secure the critical air force bases and other ground installations.

  During the 2018 Pathankot airbase attack the Garud Commando Force played

a vital role in eliminating the terrorists who attacked the base.

Intext Questions 18.2

1. What is the name of special force unit comprised of personnel from Indian Army tasked with counter-terrorism and hostage rescue operations?

2. Which is the amphibious special force unit of the Indian Navy tasked with protecting Naval assets and counter terrorism operation?

3. What is the commando unit of the Indian Air Force tasked to secure vital airbases and ground installations of the Air Force?

18.3 Indian Intelligence Agencies and India's Internal Security

Our Intelligence agencies play an important role in ensuring India's internal security. The deadly threat of terrorism can only be prevented through an efficient intelligence mechanism that shall form an essential part of our National Security.

For a Nation like ours, which is faced by multiple varieties of terrorism from both internal and external sources, we have two specialised agencies to collect intelligence from within India and outside India which are diagrammatically represented here for you.

Note

Intelligence Bureau (IB) Internal Intelligence Agency

Research and Analysis Wing (RAW) External Intelligence Agency

INDIAN INTELLIGECE APPARATUS
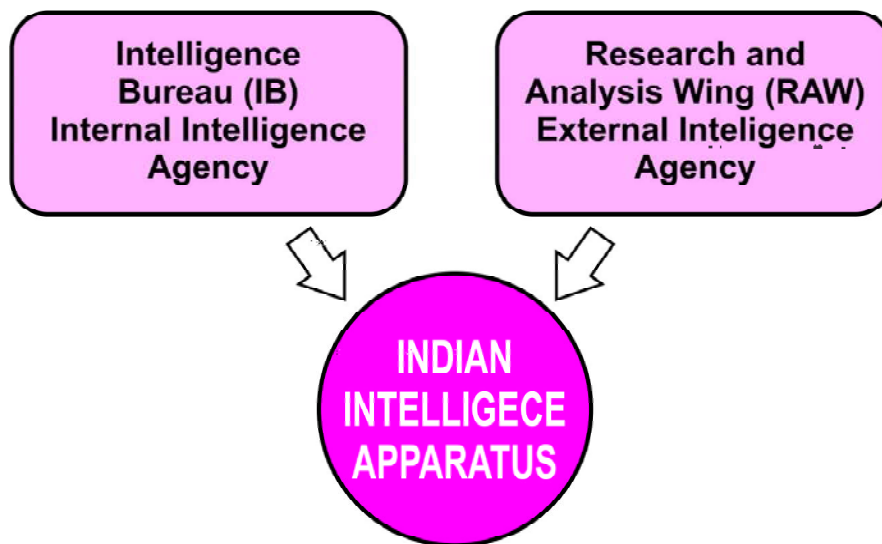
Fig 18.6 - India's Intelligence Agencies

18.3.1 Intelligence Bureau (IB)

IB is India's oldest intelligence agency formed in 1887 during the British colonial era. It is India's internal security agency responsible for managing domestic threats. IB

Module - VI

Armed Forces and itss Role in Internal Security

Note

technically falls under the authority of Ministry of Home Affairs. IB is responsible for counterterrorism, counterintelligence, and intelligence collection in border areas, infrastructure protection, and anti-secession activities.

Until the 1960's the Intelligence Bureau was tasked with collecting both internal and external intelligence. However after the formation of RAW in 1968, the IB is fully dedicated towards collecting internal intelligence.

18.3.2 Research and Analysis Wing (RAW)

The Research and Analysis Wing (RAW) is our primary foreign intelligence agency. After the intelligence failures of the Sino-Indian and Indo-Pakistani wars prior to 1965, our Government felt the need of dedicated foreign intelligence agency and as a result RAW was established in1968 under the leadership of Shri RameshwarNath Kao. who became its first director.

We should note that within just a few years after its formation the RAW played a vital role in India's astounding success in the liberation of Bangladesh in 1971 and the accession of Sikkim in 1975. Today, RAW is considered as one of the top intelligence agencies of the world. The primary task of RAW is to gather intelligence from India's hostile neighbors, to deduce their plans against our Nation and make them unsuccessful in their intentions to harm India.

Intext Questions 18.3

1.   Fill in the blanks:-

   (a)   India's External Intelligence Agency RAW was established in _____.

   (b)   The first director of RAW was _____.

What You Have Learnt

- Role of the Indian Armed Forces in counter terrorism and counter insurgency.

- The Direct and Indirect role of the armed Forces in Internal security of the country.

- Assam Rifles and its role in external and internal security of the country.

- The strategic assets of our country and their protection.

- There are some special forces which employed in safe guarding our strategic assets.

- Indian Intelligence Agencies with special reference to RAW and IB.

Terminal Exercises

1. Explain the direct and indirect role of the Indian Armed Forces in upholding India's Internal Security.

2. Identify the various special forces of the Indian Armed Forces that are tasked with protecting India's Strategic Assets. Explain their contribution.

3. Explain the importance of intelligence agencies for India's internal and external security.

4. What special functions does the Assam Rifles do?

Answers to Intext Questions

18.1

1. Rashtriya Rifles

2. ASSAM Rifles

3. Indo - Myanmar

18.2

1. The National Security Guard (NSG)

2. The 'MARCOS'

3. The Garud Command Force

18.3

1. a) 1968

   b) Shri Rameshwar Nath Kao

Curriculum

Military Studies
Senior Secondary Course

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Note

Rationale

Military training is a process, which intends to establish and improve the capabilities of military personnel in their respective roles. The primary forms of military training is recruit training, which makes use of various conditioning techniques to re-socialize civilians into the military system, ensure that they will obey all orders without hesitation, and teach basic military skills. The training methodology in the Indian Armed Forces is to equip the soldier with individual skills in order to overcome battle field situations and is therefore, primarily confined to battle drills and procedures However, the rapid change in the technology and future modes of conflict demands the soldiers to be knowledgeable to deal with situations of complex nature in peace and conflict and be capable of taking informed decision. Their exposure to Military Diplomacy by way of troop contact when India and other nations practice military exercises makes it imperative to know more than weapon handling.

Our nation, like all developed nations, requires expertise in handling and advising the Government in matters military and security. Government is beginning to engage Academia in policy formulation. This course can well form the foundation for strategic thinking on security and therefore its importance to students at the school level. At the Senior Secondary level, a child should carry the truthful perception of matters military. The curriculum aims at bridging the gaps in knowledge about the country's military power and distinguish between the various aspects of providing security to the people and the country. The senior secondary Military Studies course paper will provide knowledge regarding basics of security concepts concerning the defence forces organisation, role during war and peace, an insight into India's relations with her neighbours. This course shall also help the student to get a glimpse of the present equipment profile of Indian Armed Forces, their capabilities, futuristic technological developments in the military field including Nuclear, Biological and Chemical (NBC) Warfare.

Objectives

The main objectives of this course are :

- In service soldier student will generate capability and skills, useful in service and for resettlement in civil life.
- Examine and incorporate military security concepts, practices in order to

improve educational and professional standards.

- Knowledge derived from the course contents will enable the students to gain a holistic idea of military studies as a subject and its application in governance.

- To make the students understand the various aspects of military organization, role, tasks undertaken by the armed forces.

- To understand India's relationship with her neighbours and its importance.

- To understand the basic principles of the technological developments in the military field.

Target Group

The Target group includes the following:

(a) Combatant and Non-Combatant (tradesmen) members of Armed Forces who have studied up to Class 10.

(b) Civilian students, pan India, who opts for NIOS model of schooling.

Approach

Being a new subject and the fact that there is no precedence of learning the contents in early schooling, there is a definite necessity to structure it in a logical sequence and keep the terms and jargons connected with national security and military, in its simplistic form. Therefore, the modules will be designed to answer the basic questions of What?; Why?; And How?

Pre-Requisites

This course is designed for those who have passed 10th standard and would like to continue the education for senior secondary education from NIOS.

Equivalency

This course leads to senior secondary level (equivalent to intermediate) on par with those by other boards like state board, CBSE, ICSE.

Medium of Instruction

English (The Course shall be translated in Hindi and regional medium)

Duration of the course

The duration of the course shall be one year, with a maximum of 5 years to complete the course

Weightage

Theory : 100%

TMA   :   20% of Theory

Teaching Methodology

Theory : Printed self learning material with face-to-face contact sessions for academic support.

Assignment : One assignment shall be administered for continuous assessment.

Evaluation Procedure

Theory Paper : 100 marks

TMA : 20% of the Theory

Pass Criteria : 33%

Course Structure :
Distribution of Marks and Study hours for each module are as follows :

Sr.	Name of the Module	Marks	Study Hours
1.	Military Studies	13	31
2.	Structure and Role of the Forces	13	31
3.	Security and Geo-Strategy	14	34
4.	Indian Armed Forces : Weapons equipment and modernisation	20	48
5.	Warfare and its types	20	48
6.	Armed Forces and its role in Internal Security	20	48
	Total	**100**	**240**

Course Description

Module 1 - Military Studies

Weigtage : 13 Marks   Study Hours : 31

Approach

Military Studies is also referred as Military Science and is a study of the structure and organization of the Armed Forces and their interplay in matters of National Security. The senior secondary level curriculum is developed with the basic objectives of a

basic understanding of the Armed Forces of our country and includes cultivation of interest in core knowledge of security affairs of India. This can well form the stepping-stone and a foundation for higher learning in National security. The subjects included in the module are at the very basic level of understanding. Pictorial representation wherever required has been used to enhance the learning value.

1   **Importance of Military Studies**

2   **Concept and Evolution of Military Studies**

3   **Contemporary Need of Military Studies**

Module 2 - Structure and Role of the Armed Forces

Weigtage : 13 Marks   Study Hours : 31

Approach

As a continuum to the module about our Armed forces in the Military Studies Course, this module adds the existing texts by way of organisations of the services, Special Forces and Para Military forces, their role and structure. A lesson on Special Forces was decided to be introduced since their utilization is more visible given India's security situation. The structure and organisation makes the student understand how a force is shaped to fulfill its role and responsibilities.

1.   **Armed Forces**

2.   **Special Forces**

3.   **Para Military Forces**

Module 3 - Security and Geo-Strategy

Weigtage : 14 Marks   Study Hours : 34

Approach

The module titled Security and Geo-Strategy aims to provide an overview of India's geo-strategic importance, its varied natural resources and economic potentialities. It will help to explain the strategic importance in terms of its geographical location and will further explore the natural and human resource potentials of the country. The module also aims to explain the economic advantages of the resources and will provide an overview of the strategic relations with neighboring countries. The maritime security problems of India are also highlighted in this module.

1.   **Geo-Strategy**

2.   **Geo-Politics**

3.   **Maritime Security**

Module 4 - Indian Armed forces : Weapons and War Equipment and Modernisation

Weigtage : 20 Marks   Study Hours : 48

Approach

The Indian Armed Forces have a variety of modern weapons and battle support war equipment. The module aims at providing an overview of all the weapons and equipment in use by the Army, Navy and The Air Force. It is intended to give an idea of the weapon system within the purview of public information. No classified equipment or weapons have been included in the lessons. While explaining the weapon, a brief of the role of the force is also highlighted so that a correlation is possible, leading to better assimilation. The future trends include modernization plans, the need to modernize as well as glimpses of some weapon system.

1.   **Role and Equipment used by the Armed Forces**

2.   **Modernization of the Indian Armed Forces**

Module 5 - Warfare and its Types

Weigtage : 20 Marks   Study Hours : 48

Approach

As a continuation of the lesson on conventional weapons, India's possession of nuclear weapons makes it mandatory to have the theoretical knowledge of the potential of Nuclear, Biological and Chemical weapons. The lesson gives an introductory idea of the nuclear reaction, its application as a weapon by the Armed Forces. The effects of an NBC strike and NBC defence are highlighted with appropriate photographs and videos for better assimilation. In addition, the new world of cyber space and its potential as hard power is a must learn subject today. Basics of cyber space and threats, along with necessary defence are enumerated.

1.   **Nuclear Warfare**

2.   **Chemical Warfare**

3.   **Biological Warfare**

4.   **Cyber Warfare**

Module 6- Armed Forces its Role in Internal Security

Weigtage : 20 Marks   Study Hours : 48

Note

Approach

Armed Forces are usually associated only with war. The useful utilization of the armed forces for the society is an important adjunct to the knowledge. Armed Forces play a crucial role in the upliftment of society. This module covers the aspect of peacekeeping operations conducted by UN and our participation and current deployment. The Module also covers the role of armed forces in disaster management and internal security. Suitable photographs and web links for audio-video projections have been included to enhance retention of knowledge gained. A logical step by step of explanation of the topic has been followed in simple language.

1. **Armed Forces in peace keeping**

2. **Armed forces in disaster Management**

3. **Armed forces in Internal Security**

Learning Outcomes

Military Studies.

Lesson no.: 1 Importance of Military Studies

After studying the lesson, the learner will be able to

- Explain the importance of military studies.
- Highlight the different aspects of military studies.
- Analyze the ethics of war fighting.

Lesson No. : 2 Concept and evolution of military studies

After studying the lesson, the learner will be able to

- Explain the military education organization and institutions in ancient/medieval period.
- Describe the different types of military education and training in the in the past
- Assess the evolution and growth of military studies
- Describe the military education system during British India and the process of indianization of military training.

Lesson No. : 3 Need of Military Studies today

After studying the lesson, the learner will be able to

- Highlight the changes in military studies over the ages
- Explain the transformation of armies and training in different period
- Assess the impact of technology on warfare
- Describe the modern system of military training.

Lesson No. 4 Armed Forces

After studying the lesson, the learner will be able to

- Describe the organization structure of Indian army
- Know the importance and role of the army, Airforce and navy
- Explain the structure of Indian Navy and Airforce.
- Analyse the importance of defence services

Lesson No. 5 Special Forces

After studying the lesson, the learner will be able to

- Narrate the history of Special Forces of India and other parts of the world
- Explain the structure of special forces

● Describe the different units of special forces in India

Lesson No. 6 Para Military Forces

After studying the lesson, the learner will be able to-

● Explain the importance and role of Paramilitary forces.

● Assess the need of Paramilitary forces.

● Describe the different Paramilitary forces and their specific purposes.

Lesson No. 7 Geo – Strategy

After studying the lesson, the learner will be able to-

● Explain the meaning and purpose of Geo-Strategy

● Analyse the relation between natural resources and Geo-strategy

● Describe the different energy resources of India and their contribution.

● Analyse the relation between economic growth and military power.

Lesson No. 8 Geo-Politics

After studying the lesson, the learner will be able to

● Explain the meaning of Geo-Politics

● Highlight the soft and hard power in India

● Recognize and describe the neighbors of India and their mutual relations

● Explain the purpose and importance of SAARC and its limitations

● Explain the Panchsheel and non-alignment policy of India

● Assess the relations of India with its neighbours.

Lesson No. 9 Maritime Security

After Studying the lesson, the learner will be able to

● Explain the meaning and purpose of maritime security.

● Highlight the importance of maritime security for India and major maritime threats

● Describe the different agencies and institutions of maritime security.

● Name the different important ports in India and their contribution in the growth of economy

Lesson No.10 Role and equipment used by the Armed Forces

After studying the lesson, the learner will be able to

● Learn about different ships of Indian Navy and their weapon system

● Describe about the different aircrafts of the Indian Airforce and their roles.

Lesson No. 11 Modernisation of the Indian Armed Forces

After studying the lesson, the learner will be able to

● Explain the need for modernisation of Army, Navy and Airforce.

● Analyse the challenges being faced for modernisation of armed forces.

Lesson No. 12 Nuclear Warfare

After studying the lesson, the learner will be able to

● Explain the terms – Nuclear energy, Fission Fusion, Chain reaction and effects

● List the characteristics and effects of Nuclear Explosion

● Know the meaning and effects of Nuclear Radiation

● Describe about the different measures of protection from the ill effects of nuclear explosion

Lesson No. 13 Biological Warfare

After studying the lesson, the learner will be able to

● List different types of Biological Warfare agents

● Recognize the characteristics of BW agents

● Assess the requirement of BW agents and select the desired agent

● Describe the means of delivery of BW agents

Lesson No. 14 Chemical Warfare

After studying the lesson, the learner will be able to

● Know the different types of chemical agents for military use

● Recognize the characteristics of different chemical agents and their effects on the human body

● List the symptoms of different chemical agents on the human body

● Describe the various protein measures against the dangerous chemical agents

Lesson No. 15 Cyber Warfare

After studying the lesson, the learner will be able to

● Explain the meaning of cyber warfare and its threats

● Recognize the cyber crimes and the cyber weapon used

● Explain the national cyber security policy and the remedial measures against the cyber attack

Lesson No. 16 Armed Forces in Peace Keeping

After studying the lesson, the learner will be able to

● Explain the need and meaning of peace keeping operations

● Highlight the importance of peace keeping in the charter of United Nations.

● Explain the principles of peace keeping

● Assess the contribution of India army in the UN peace keeping missions

Lesson No. 17 **Armed Forces in Disaster Management**

● After studying the lesson, the learner will be able to

● Recognize different types of disasters

● Know the role of armed forces during the disaster period

● List the functions of National Disaster Management authority

● Highlight the Do's and Don'ts during the disaster period

Lesson No. 18 Armed Forces in Internal Security

After studying the lesson, the learner will be able to

● Explain the role of armed forces in internal security

● Assess the need of protecting the strategic assets of India

● Describe about the specific divisions of armed forces for protection of India's strategic assets

● Know the importance and role of Indian intelligence agencies in India's Internal security

Question Paper Design

Subject: Military Studies   **Class: Senior Secondary**

Total Marks: 100   **Time: 3 hrs**

1.   Weightage to Objectives

Objective	Marks	Percentage
Knowledge	30	30
Understanding	55	55
Application/Skill	15	15
Total	**100**	**100**

2.   Weightage of Questions

Forms of Questions	No. of Questions	Marks of each Question	Marks Allotted
Long Answer Type (LA)	6	6	36
Short Answer (SA)	12	4	48
Very Short Answer (VSA)	6	2	12
MCQ	4	1	04
Total	**28**		**100**

3.   Weightage to Content Areas

Module	Marks	Study Hours
Module I	13	31
Module II	13	31
Module III	14	34
Module IV	20	48
Module V	20	48
Module VI	20	48
Total	**100**	**240**

4.   Difficulty level

Level	Marks	Percentage
Difficult	25	25
Average	50	50
Easy	25	25
Total	**100**	**100**

Sample Question Paper

Military Studies (374)

Time: 3 hours   **Maximum marks: 100**

1. Which one of the following was considered as a sign of unconditional surrender
    by the soldiers in ancient armies.   1

    (a)   Showing and waving a white flag
    (b)   Shouting at the top of one's voice 'stop', 'stop', 'stop' ......
    (c)   Holding a straw in one's lips
    (d)   Flying a white pigeon

2. Which one of the following is headed by a Squadron Leader?   1

    (a)   Section   (b)   Flight
    (c)   Wing   (d)   Station

3. Which one of the following is not a UN peacekeeping mission?   1

    (a)   UNIFIL   (b)   MONUSCO
    (c)   UNESCO   (d)   UNOCI

4. Which one of the following should be done before cyclone?   1

    (a)   Drink boiled water
    (b)   Switch off your mobiles
    (c)   Keep your documents and valuables in water proof containers
    (d)   Switch off electrical mains

5. Evaluate the use of tactics in a battle.   2

6. Explain the role of Indian Army.   2

7. Explain the main objective of creating the special frontier force.   2

8. What is meant by maritime security?   2x1=2

9. Name any four fighter aircrafts.   4x½=2

10. What does the term the strategic assets of a nation denote? Give any four
    examples.   1+1=2

11. Describe any four advantages of teaching military studies to the soldiers. 4x1=4

12. Name and describe the sub divisions under each command of the Indian Air Force.   4

13. Explain the functions of the Central Reserve Police Force (CRPF).   4x1=4

14. Mention any two advantages of population from a military perspective. Also describe the advantages of diversity for a country like India.   2+2=4

15. What is meant by economic power of a country? Explain the importance of agriculture, industries and services in achieving economic power.   1+3=4

16. Evaluate the strategic importance of maritime boundaries.   4

17. Describe any four features of the aircraft carrier INS Vikramaditya   4x1=4

18. Explain the two important features each of the transport aircrafts named Cheetah and Chetak.   2+2=4

19. Every Indian expects Indian Air Force to be strong enough to face any threat from the rival neighbouring country. Suggest any two steps to be taken by Government to strengthen the Indian Air Force.   2+2=4

20. Explain any two precautions to be observed to keep your computer systems safe from cyber penetration.   2x2=4

21. Draw a diagram to show the estimated size of the damage caused by the 16 KT and 22 KT atomic bombings of Hiroshima and Nagasaki.   4

22. Highlight the role of special forces - the National Security Guard (NSG) and the Garud Commando Force.   2+2=4

23. Highlight any three aspects of the army that changed during the British period before World War II.   3x2=6

24. Explain any three challenges in modernisation of Armed Forces.   3x2=6

25. List any six characteristics of a nuclear explosion depending upon the type of burst.   6x1=6

26. What is cyber security? Explain the four types of cyber threats.   2+4=6

27. Describe any three UN peacekeeping missions currently being undertaken by the India Armed Forces.   3x2=6

28. Explain the role of armed forces in disaster management with the help of any three examples.   3x2=6

Marking Scheme

Military Studies

1. (c) Holding a straw in one's lips   1

2. (b) Flight   1

3. (c) UNESCO   1

4. (c) Keep your documents and valuables in water proof containers   1

5. **Use of tactics :**   2

(i) They help the army units to maneuver to a position of advantage in a battle.

(ii) Different tactics have to be thought over against different types of enemies, different terrain etc.

6. It's major role is to protect the territorial integrity of our country and safeguard its sovereignity. Helps civil administration during natural or man made disasters. May also participate in UN peace keeping force.   2

7. It's main objective was to conduct covert operations behind Chinese lines in the event of another Sino-Indian war.

It is primarily used for conducting clandestine intelligence gathering and commando operations along the line of Actual Control with China.   2

8. • Maritime security involves protecting the nations severeignty from threats asising from the oceans and seas.

• It includes protecting coastal areas, safeguarding the available ocean resources.

• It also means maintaining freedom at sea for movement of our ships and facilitating trade practices.   2x1=2

9.   (i)   MIG-21 Bison

    (ii)   Jaguar

    (iii)   MIG-27

    (iv)   MIG-29

    (v)   Mirage-2000

    (vi)   SU-30 MKI

    (vii)   Tejas   (Any four) $4 \times \frac{1}{2} = 2$

10.   •   The term strategic assets of a nation denotes the important military and civilian infrastructures, which are essential for a nation's security, technological advancement and economic growth.

    •   Examples :

      (i)   Military bases

      (ii)   Ports and Airports

      (iii)   Oil refineries

      (iv)   Nuclear power plants

          (Any other asset)   1+1=2

11.   **Advantages**   4x1=4

    (i)   Makes the soldiers highly professional and proficient.

    (ii)   Enables the armies to be ready to fight at any time.

    (iii)   Study of this subject helps the soldiers to understand planning of strategy and tactics.

    (iv)   It improves the morale confidence of the soldiers.

    or any other relevant point.

12.   **Sub divisions under each command are as follows-**   4

    Section: Smallest unit in Air Force. Three air crafts make a section. It is commanded by Flight Lieutenant.

    Flight: Two sections make a flight - headed by Squadron Leader

    Squadron: Three flights make a squadron - has 18 aircrafts and headed by Wing

Commander / Group Captain.

Wing: Two or three squardrons make a wing headed by Group Captain/Air Commodore.

Station: One wing and one or two squadrons make a station is headed by Air Commodor. Large station is headed by Air Vice Marshal.

13. **Important Functions-** 4x1=4

(i) To assist the state/union territories in police operations to maintain law and order and counter insurgency.

(ii) Plays important role in India's General Elections.

(iii) Looks after the internal security of every part of India.

(iv) Works as a part of IPKF (International Peace Keeping Force) of UN.

(v) Works for VIP security.

(vi) Guards vital institutions and installations.

(vii) Counters the Naxal's operations. (Any four)

14. **Advantages of population:** 2+2=4

(i) The population provides the manpower requirement of all the three services of Indian Military.

(ii) India has a large concentration of very young population which is most suitable to the forces.

or any other advantage

Diversity of India

No other country in the world exhibits such variety of speech, written language, religious and social customs as India does. India is a home of 22 major languages in all 845 languages.

People belong to various social groups.

15. **Economic Power :**

• The economic power of a country is the capacity to use its economic resources and assets in order to achieve self sufficiency.

• Agriculture: A nation that is self-sufficient in food and agriculture need not

depend on other countries. Since, it is the chief occupation of 70% population, it is the main source of livelihood. All types of agricultural products earn considerable amount of foreign exchange for the country.

- Industrial Resources: In recent year, India has made significant progress in industrial development. Modern factories in India are turning out all builds of goods. They provide not only employment but also earn lot of foreign exchange. India is manufacturing in almost all the sectors.

- Services: They provide support to the economic activities. They include tourism, education, healthcare, engineering, communication, transport etc. The services sector in India occupies a predominant show of India's economic activities.   1+3=4

16. **Strategic Importance :**
- The Indian Ocean Region (IOR) is of immense strategic importance to India.

- Most of the country's oil and gas is imported through the sea.

- More than 80% of the world's sea born oil trade goes through the Indian ocean.

- More than half of the world's armed conflicts are presently located in the Indian ocean region.

- Since terrorism and piracy add to the tensions in trade and defence, the importance of maritime boundaries become more important.

(Any other relevant point) (Any four)   4

17. **Four factor of Aircraft:**
(i)   It was bought from Russia and refitted.

(ii)   It can carry upto 34 fixed wing aircrafts and helicopter.

(iii)   The MIG 29K is the main fighter aircraft on board.

(iv)   It is literally a floating city with about 1600 personnal on board.

(v)   It carries food for a period of 45 days.

(Any four)   4x1=4

18. **Features of Cheetah :**   2+2=4

(i)   Single engine turbo shaft, helicopter of French origin.

(ii)   Can carry 3 passengers or 100 kg external sling loads.

(iii)   Has maximum speed of 121 km/hr and can climb to 1 km in 4 minutes.

(Any two)

Features of Chetak:

(i)   Single engine turbo shaft, light utility French helicopter.

(ii)   Has capacity of 6 passengers or 500 kg load.

(iii)   Has maximum speed of 220km/hr.

(Any two)

19.   Learner is face to express his/her view point. Some of the following steps may be included :

(i)   Add modern / new aircrafts.

(ii)   More budget should be allocated.

(iii)   Research work should be promoted to develope target oriented missiles and other weapons.

(iv)   Improved and modern weapons and technology should be purchased from other developed countries.

(v)   Any other   (Any two)   2+2=4

20.   Precautions:

(a)   Install latest patches for the OS and application being used from a trusted website only. A good firewall would act as the first line of defence to alert the user if any application / programme is trying to connect his PC over the internet.

(b)   Install a good internet security suite: They combine the functionality of antivirus, antispyware, firewall, parental controls etc.   2x2=4

21.   4
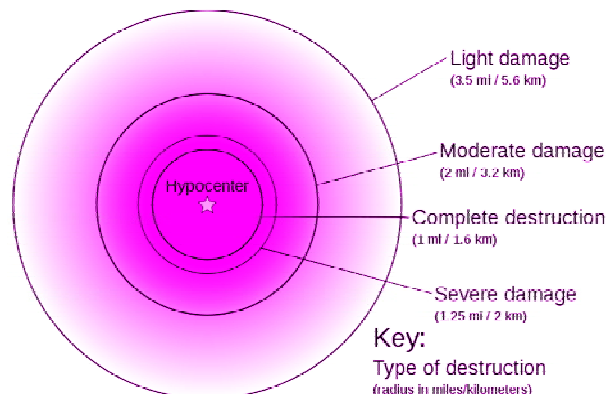
22. • N.S.G

The primary task of the NSG is to combat terrorism in order to protect states against internal disturbances. The NSG engages in important internal security operations like rescuing sortages from terrorists attacks etc.

• The Garud commando Force is the special force unit of the IAF and equivalent to its counter parts in the Army and Navy. Its most important task is to secure the Critical Air Force bases and other ground installations.

2+2=4

23. **The changes that took place** 3x2=6

(i) Army became Armed Forces with the raising of Air Force and Navy.

(ii) Training in Military subjects became specialized to each of the three wings of armed forces - Army, Navy and Air Force.

(iii) Reorganisation of Army was done to suit the new methods of battle.

(iv) The standard infantry has rifles, machine guns, guns, mortars, Anti Tank Missiles etc.

(v) Swords were replaced by Rifles.

(vi) Tri-service training was introduced so that all the three services could fight the war together.

(Any three)

24. **Modernisation of Armed Forces** is needed to entrance the capability of the army to face the armed strength of the rival country. The major aspects that become a challenge as an given below -

(i) A Military strategy to address National Security. It is a strategy that enables to identify and respond to a threat. Improved new weapons are required to face such threats.

(ii) Economy - For a faster growing economy - faster modernisation of the forces is required. In other words the economy of the country decides the pace of modernisation of the armed forces.

(iii) Adequate budget allocation: For modernisation - a huge budget allocation is required. It shows that modernisation is dependent on the policies and programmes of the government.

(iv) Research in military technology - Research in the defence mechanism also creates the need for modernisation. In India agencies like DRDO are engaged in the research works. (Any three) 3x2=6

25. **Characteristics :**   6x1=6

(i)   An intense bright flash

(ii)   A firewall

(iii)   A thermal heat pulse of thermal radiation

(iv)   A pressure wave-giving rise to blast and shok

(v)   Radiation

(vi)   Electro-magnetic phenomenon

(vii)   A prominent cloud   (Any six)

(*Module VI - 12.3*)

26. **Cyber security** is the evolution of policies and procedures to protect own information and information system.

Types of Threats

(i)   Cyber Attacks: These are the intrusions where immediate damage or disruption caused are the main concerns.

(ii)   Cyber Espionage: It is an act of intrusion which can provide the information needed.

(iii)   Cyber Sabotage: Computers and satelites that coordinate other activities are vulnerable components of a system and could lead to the disruption of equipment.

(iv)   Cyber Propaganda: Its aim is to control information and influence public opinion. It is a form of psychological warfare.   2+4=6

(*Module VI - 15.1*)

27. **UN Peacekeeping :**

(a)   Lebanon (UNIFIL): Indian army personnel and officers have been deployed since 1998 in Lebanon and still working for the mission. Current situation is tense due to the crisis in Syria.

(b)   Congo (MONUSCO): Since 2005, infantry, army aviation contigent with utility helicopters have been deployed and working at Congo. Units of BSF and ITBP have also been added and deployed since 2009.

(c)   Sudan and South Sudan: Infantry Battalion, Engineer company, signal company - and other staff has been deployed since 2005. Current situatiohn is very volatile in Sudan.

(d)   Golan Heights

(e)   Ivory Coast

(f)   Haiti

(g)   Liberia   (May also be listed and described)   3x2=6

28. The armed forces of India have an important role in managing disasters :

    • providing relief to affected people;

    • restoring essential services like water supply of safe drinking water

    • communication and

    • power supply

    Examples -

    (i) During Cyclone Wardha - Indian Navy moved supplies by ships to Chennai. Air dripping of food packets to the affected and airlifting of stranded and injured people.

    (ii) Earthquake in Nepal - Indian Army dispatched relief material - operation Maitry was launched by India Army.

    (iii) Cyclone Ockhi - 2017 which ravaged the coast of Kanyakumari, Lakshdweep - Indian Navy transported tonnes of food, water, blankets, raincoats, mosquito nets. (Any two examples)   2+2+2=6