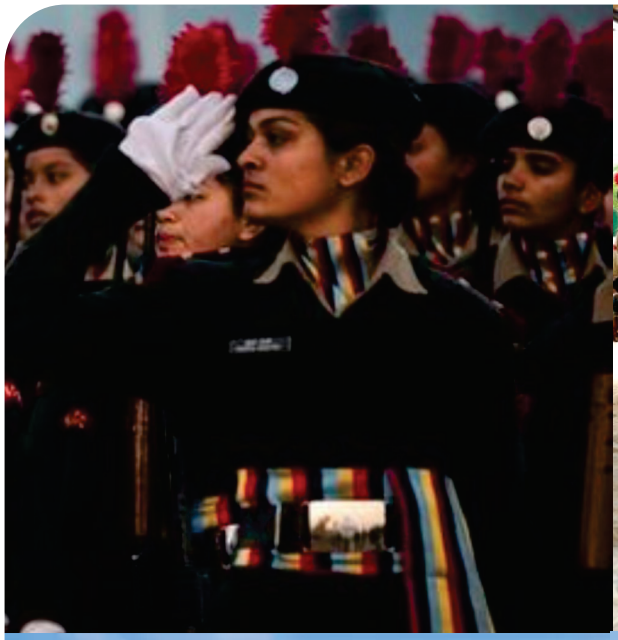
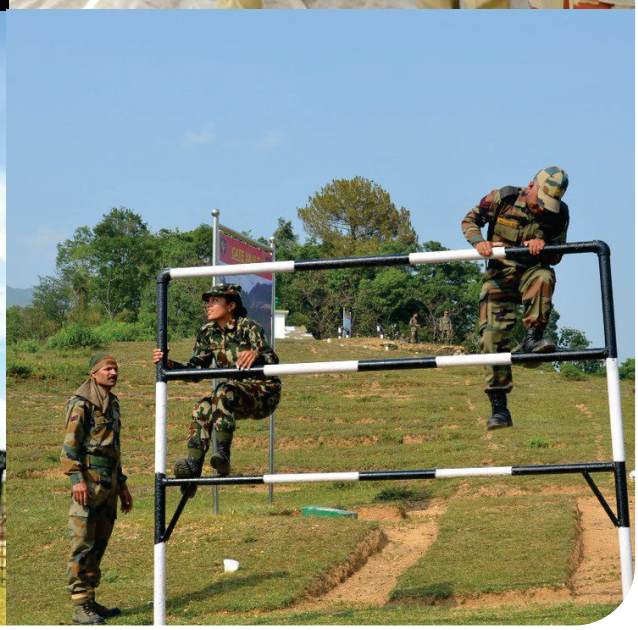
COMMON SUBJECT

TECHNICAL SKILLS





EDITION : 2025

JD/JW CADETS' HAND BOOK
NATIONAL CADET CORPS

MASTER INDEX : NCC TECHNICAL SKILLS (JD/JW)

SER	CODE	SUBJECT	PERIODS		TYPE	PAGE
			1st Yr	2nd Yr		
(CODE - OT) OBSTACLE TRAINING (02 PERIODS)						
16.	OT-1	Introduction	1	1	T/P (Outdoors Familiarisation)	109
17.		Obstacle Course and Method of Negotiation				
18.		Dress				119
19.		Obstacles for Senior Wing Cadets				
20.		Methodology of Negotiating the Obstacle Course				
21.		Safety Measures for Successful and Safe Completion of the Obstacle Course				120
22.		Benefits of Obstacle Course Training				
23.		Demonstration				121
(CODE - D) DRONES (04 PERIODS)						
24.	D-1	Evolution and Types of Drones	1	-	T	127
25.	D-2	Basic Principles of Flight	-	1	T	139
26.	D-3	Application of Drones	-	1	T	149
27.	D-4	Drone Operations	-	1	T	162
	TOTAL PERIODS		**28**	**28**		

SUMMARY

S NO	CODE	1ST YEAR		2ND YEAR		TOTAL NO OF PERIODS
		THEORY	PRACTICAL	THEORY	PRACTICAL	
1.	DRILL	-	14 x Pds PI Staff 1 x Pd ANO for Sizing	-	14 x Pds PI Staff 1 x Pd ANO for Sizing	30
2.	WT	3 x Pds PI Staff	8 x Pds PI Staff	-	9 x Pds PI Staff	20
3.	OT	-	1 x Pd PI Staff	-	1 x Pd PI Staff	2
4.	DRONES	1 x Pd Officer/ Trained PI/ AMI / CGI	-	3 x Pds Officer/ Trained PI / AMI / CGI	-	4

FOOT DRILL

1

CHAPTER WISE INDEX - FD (JD/JW)

FOOT DRILL (JD/JW)

CHAPTER FD I: GENERAL DRILL INSTRUCTIONS AND WORD OF COMMAND

"Rank may get you Customs & Courtesies but Character will get you Respect"

TEACHING INSTRUCTIONS

Total Periods : Three (03).

Type : Theory & Practical.

Year : Ist Year - 02 Periods & IInd Year - 01 Period.

Conducting Officer: Permanent Instructor.

Training Aids : Black Board, Chart & Training Video.

Time Plan		**Ist Year**	**IInd Year**
• Introduction/ Recapitulation (Theory)	:	10 Min	05 Min
• General Instructions of Drill (Practical)	:	30 Min	15 Min
• Words of Command (Practical)	:	30 Min	15 Min
• Revision/Consolidation (Theory/Practical)	:	10 Min	05 Min

INTRODUCTION

1. Foot drill is a part of the training schedule of the Armed Forces worldwide. “Foot Drill” or “Drill” stems from time since antiquity when soldiers would march into battle, be expected to gather in a formation and react to words of command from their commanders once the battle commenced. In the history of Army, the training of drill started with the objective of uniting the troops and making them march in a uniform manner. Drill is an effective means through which discipline, turnout and team spirit are inculcated in the troops. Drill thus has played a key role in maintaining the foundation of discipline even in the battlefield.

PREVIEW

This lesson will be conducted in two parts:-

- **Part I : General Drill Instructions.**
- **Part II : Words of Command.**

LEARNING OBJECTIVES

- **Basic understanding of drill.**
- **Definition of drill, types of drill.**
- **Purpose and principle of drill.**
- **Bad habits of drill.**
- **Words of command.**

PART I: GENERAL INSTRUCTIONS FOR DRILL

2. **Definition of Drill.** The process of performing a procedure in a sequential and proper manner is called drill.

3. **Types of Drill**. There are two types of drills:-

   (a) **Open Drill**. It is done in the field.

   (b) **Close Drill**. Close drill is done in **peace** on parade ground.

4. **Purpose of Drill**. Drill has the following purposes:-

   (a) Drill is the foundation of **discipline**.

   (b) Drill inculcates the habit of **working together** and following **orders**.

   (c) Drill teaches **command and control** to all Cadets and individuals.

   (d) Drill teaches how to **wear uniform** and **walk**.

   (e) By observing the drill, one can judge the **discipline** and **morale** of a cadet.

5. **Principles of Drill**. There are three principles of drill:-

   (a) Smartness.

   (b) Steadiness.

   (c) Co-ordination.

6. **Principles of foot drill.** Shoot the feet forward.

7. **Undesirable Habits in Drill.** Undesirable habits in drill are as follows:-

   (a) Rolling of the eyes.

   (b) Hopping and jumping.

   (c) Dragging the feet.

   (d) Clicking the heels.

   (e) Moving the toes in boots.

PART II: WORDS OF COMMAND

8. A correct word of command depends on the **tone** and **pitch** of the voice. The correct word of command is given in a **clear** and **loud** voice so that it is acted upon immediately. The following points are important for giving a good word of command:-

(a) **Loudness *(Swar)***. The loudness of the Word of Command depends on how many people are being given the word of command and how far apart they are. To give the Word of Command, the commander stands in front of his squad, facing them. The Word of Command is always given in ***SAVDHAN*** position.

(b) **Clarity *(Spasht)***. A **clear** word of command should be given with proper coordination of tongue, lips and teeth. A poor word of command will neither generate the enthusiasm, nor the zeal, spirit or excitement in the squad.

(c) **Pitch**. Correct **pitch** is essential for correct word of command.

(d) **Timing.** Correct **timing** of word of command is very important for its immediate implementation. A word of command has two parts **'Cautionary** and **Executive'**. There should be a difference of four quick steps between Cautionary and Executive word of command. In quick march (***tej chal***) 'Cautionary' word of command starts on the **left foot**.

9. **Words of Command**. The following words of command are given in the drill (Demonstrate sample with statements):-

(a) ***SAVDHAN*** aur ***VISHRAM***

(b) ***DAHINE MUD*** ya ***BAYEN MUD***

(c) ***PICHE MUD***

(d) ***DAHINE DEKH*** ya ***BAYEN DEKH***

(e) ***TEJ CHAL*** ya ***DHIRE CHAL*** aur ***THAM***

(f) ***KHULI LINE CHAL*** ya ***NIKAT LINE CHAL***

(g) ***LINE BAN, SAJ JA*** ya ***VISARJAN***

(h) ***DAHINE SALUTE, BAYEN SALUTE*** ya ***SAMNE SALUTE***

CONCLUSION

10. Drill is an important part of organized NCC and Army training. It instills a strong sense of discipline amongst cadets, which is essential for succeeding in life. Drill also helps in developing correct military bearing and conduct. Right grooming, with confidence instilled will not only make the cadets an ambitious leader but would also impose the responsibility of efficiently carrying the Team. The appearance and turn out arises self- confidence which in a way develops the quality of immediate and implicit obedience to orders and teamwork.

SUMMARY

- The process of performing a procedure in a systematic and proper manner is called drill.
- There are two types of drills: -
  - **Open Drill**. It is done in open on field.
  - **Close Drill**. It is done on the parade ground, while in peace.
- There are three principles of drill: -
  - Smartness.
  - Steadiness.
  - Coordination.
- **Principles of foot drill**. Shoot the feet forward.
- Drill has the following objectives:-
  - Drill is the foundation of **discipline** and inculcates the habit of **working together** by following orders.
  - Drill teaches **command and control** to Cadets and Officers alike.
  - Drill teaches how to **wear uniform smartly** and **walk with confidence**. By observing drill, one can judge the **discipline** and **morale** of a cadet.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. How many types of drill are there?

(a) Two (b) Four

(c) Five (d) Eight

Q2. How many types of Words of Command are there?

(a) Three (b) Four

(c) Two (d) Seven

Q3. How many types of foot drill are there?

(a) Two (b) Five

(c) Three (d) Seven

Q4. Correct pause is essential for?

(a) Foot drill (b) Arms drill

(c) Ceremonial drill (d) All the above

Q5. A properly delivered 'Command' is _____ and Distinct enough to be clearly understood by every person.

(a) Slow (b) Heavy

(c) Long (d) Loud

Q6. The word of command _____ is given for final dispersal at the end of the parade.

(a) Visarjan (b) Aaram Se

(c) Kadam Tal (d) Line Tod

Q7. The Drill which is done during peace time and in parade ground is called_____.

(a) Close Drill (b) Ceremonial Drill

(c) Foot Drill (d) Open Drill

Q8. During Drill, you should not do the following:-

(a) Roll your eyes (b) Lift your knees

(c) Dig your heels (d) Swing your arms

Q9. During Drill, you should not do the following:-

(a) Click your heels (b) Drag your feet

(c) Both of these (d) None of these

Q10. Word of Command is always given in _____ position.

(a) Saavdhan (b) Vishram

(c) Aram Se (d) Picche Se

Q11. Clarity of Word of Command can be achieved by good coordination of the following:-

(a) Tongue, Teeth and Lips (b) Teeth and Lips

(c) Tongue and Lips (d) None of these

Q12. Following are the parts of Word of Command:-

(a) Loud and Clear (b) Cautionary and Executive

(c) Pitch and clarity (d) Loudness and Pitch

Short Answer Questions.

Q1. Write definition of drill?

Q2. How many principles are there in drill?

Q3. What is the purpose of drill?

Q4. What are the undesirable habits in drill?

Q5. Write names of training aids for drill?

Long Answer Questions

Q1. Write the objective of drill?

Q2. What are the bad habits in drill?

Q3. Write the method of teaching drill?

Q4. Write the method of giving words of command in drill?

Q5. How many types of words of command are given in drill? Write in detail.

Q6. What are the words of command and why is it needed?

FOOT DRILL (JD/JW)

CHAPTER FD II: SAVDHAN, VISHRAM, AARAM SE AUR MUDNA

"" The Harder you Train, the Harder you are to Beat"

TEACHING INSTRUCTIONS

Total Periods	: Four (04).
Type	: Lecture and Practice.
Year	: Ist Year - 02 Periods & IInd Year - 02 Periods.
Conducting Officer	: Permanent Instructor.
Training Aids	: Chart, Black Board & Training Video.

Time Plan		**Ist Year**	**IInd Year**
• Introduction/Recapitulation (Theory)	:	20 Min	15 Min
• Savdhan, Vishram, Aaram Se (Practical)	:	25 Min	30 Min
• Khade Khade Mudna (Practical)	:	25 Min	30 Min
• Revision/Consolidation (Practical)	:	10 Min	05 Min

INTRODUCTION

1. Whenever any drill action is to be performed, it always starts from the ***Savdhan*** position. Apart from this, if you have to talk to your senior, the conversation is done from ***Savdhan*** position only. The body posture has to be upright, and one should not be leaning on anything or standing on one leg. When you finish talking to your senior, then ***Vishram*** is done or when the drill action is over, you do ***Vishram aur Aram Se***.

PREVIEW

This lesson will be conducted in two parts:-

- **Part I: Savdhan, Vishram aur Aaram Se.**
- **Part II: Khade Khade Mudna.**

LEARINNG OBJECTIVES

- **Basic understanding of Savdhan, Vishram, Aaram Se and Mudna.**
- **Bayan aur ginti ke saath namuna.**

PART I: SAVDHAN, VISHRAM AUR AARAM SE

2. ***Savdhan.***

(a) Whenever any action has to be done in the drill, it always starts from the ***Savdhan*** position. Apart from this, if you have to talk to your seniors then the conversation is done in ***Savdhan*** position only.

(b) ***Bayan se Namuna***. When you get the word of command ***Savdhan*** raise your left foot to 6 inches and join the heel of your right foot with the heel of your left foot. When your left foot touches the ground, shout ***'Ek'.*** Things to observe in this position are:-

(i) Both heels are joined and the angle of toes is 30 degrees apart.

(ii) Both knees should be tightly held and steadfast.

(iii) Both arms should be joined along the stitching of the trouser on right and left side, and the fists should be closed naturally.

(iv) Trousers should be pulled up till navel, chest raised, shoulders pulled back, neck joined to the collar, chin up and eyes should be focused in front.

3. ***Vishram aur Aaram Se*.**

(a) When we finish the discussion with the senior or after the drill activity is over, we come to ***Vishram aur Aram Se***.

(b) ***Bayan se Namuna*.** When you get the word of command ***Vishram*** from the ***Savdhan*** position, raise your left feet 6 inches, move 12 inches away and keep it on the ground and at the same time, take both the arms back, hold your left hand below and right hand above and shout '***Ek'***. Things to look at in this position are:-

(i) 12 inches distance between the heels.

(ii) Both knees are tightly held.

(iii) Both hands are joined behind, left hand below and right hand and fingers pointing down.

(iv) Distribution of weight is even on both the feet.

(v) On the word of command ***Aaram* Se,** relax the upper part of the body above the waist but the feet will not move.

PART II: KHADE KHADE MUDNA

4. ***Dahine Mudna.***

(a) When we are standing at a place and have to change our direction and formation to 90 degrees to the right, then ***Dahine Mud*** is done.

(b) **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*).**

(i) When you get the word of command from ***Savdhan*** position, count ***'Ek'*** and on this word of command turn your right foot and the toe of your left foot quickly to 90 degrees towards the right and shout ***'Ek'***. Things to see in this position are that the right foot is completely on the ground and the weight of the body is on the right foot, the toes of the left foot are on the ground and the left heel is raised and both legs are turned briskly.

(ii) When you get the word of command '***Do'*** on this word of command raise your left foot 6 inches up and place it close to your right foot and shout '***Do'***. Things to observe in this position - The direction should be changed to 90 degrees on the right side.

5. ***Bayen Mudna*.**

(a) When we are standing at one place and need to change our direction and formation by 90 degrees to the left then the action of '***Bayen Mud'*** is done.

(b) **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*).**

(i) When you get the word of command from the '***Savdhan'*** position count ***'Ek'*** and on this word of command with the help of the left foot and the toes of the left foot, turn left at 90 degrees and shout ***'Ek'***. Things to observe in this position – the weight of the body should be on the left foot and the right foot should be on the ground. The toe of the right foot should be on the ground and the heel should be raised, both legs should be tightly kept.

(ii) When you get the word of command '***Do'*,** raise your right foot 6 inches up and place with your left foot and shout '***Do***'. Things to look out for in this position - the direction should be changed to 90 degrees on the left side.

6. ***Pichhe Mudna***.

(a) When we stand at a place and change the direction 180 degrees backwards while keeping our formation, then ***Pichhe Mud*** is done.

(b) **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*).**

(i) When you get the word of command from the ***Savdhan*** position ***Ginti se Mudna Ek***, then on this word of command turn quickly to 180 degrees backwards on the right foot and the toes of the left feet on the ground and heel raised and shout ***'Ek'***. Things to see in this position – the right foot is completely on the ground; the weight of the body is on the right foot and the toes of the left foot are raised from the ground. The muscles of both legs are tightened and the thighs are locked.

(ii) When you get the word of command '***Do'***, raise your left foot 6 inches above your right foot and put with your right foot and shout '***Do'***. The thing to watch out for in this position is that the direction should be changed to 180 degrees and the rest of the positions should be same as '***Savdhan'***.

7. ***Aadha Dahine Aur Bayen Mudna***.

(a) When the standing squad has to practice salute or if right/left squad has to be formed or change of direction action has to be done then '***Aadha Dahine ya Bayen Mud'*** is done.

(b) **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(i) The action is same as '***Dahine/Bayen Mud'***, the only difference being that you have to turn half left/right by 45 degrees only.

CONCLUSION

8. ***Savdhan, Vishram, Aaram Se, and Mudna*** are basic movements and word of command of drill. Learning of these movements is a prerequisite for Arms and Ceremonial Drill. Instructor must demonstrate these movement by statement and count. The cadets must practice and observe timings carefully while carrying out any movement of drill.

SUMMARY

- When any drill action has to be done, it always starts from the '***Savdhan'*** position. Apart from this, if you have to talk to your senior, then the conversation is done in '***Savdhan'*** position only.
- In assuming the position of '***Savdhan'***, heels are brought together with extreme sharpness by lifting the left foot six inches from the ground and placing it flat and very firm besides the right, avoiding stamping of foot.
- When we finish talking with the senior, then '***Vishram'*** is done or after the drill is over, we come to '***Vishram'***.
- When we are standing at a place and have to change our alignment and formation at 90 degrees to the right, then '***Dahine Mud'*** is done.
- When we are standing at a place and have to change our alignment and formation at 90 degrees to the left then '***Bayen Mud'*** is done.
- When we are standing at a place and have to change the direction while maintaining our formation at 180 degrees towards back then '***Piche Mud***' is done.

DID YOU KNOW?

- **'*Savdhan***' command is given when a drill has to commence or when the cadet is talking to or being addressed by his senior officer.
- The command '***Vishram'*** is given when the drill has got over or when the address of the senior officer is over.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q 1. How many inches do you raise your left foot in the *Savdhan* position?

(a) 4 inch (b) 6 inch

(c) 2 inch (d) 8 inch

Q 2. What is the angle of the toe in the *Savdhan* position?

(a) 40 degree (b) 30 degree

(c) 20 degree (d) 50 degree

Q 3. In *Vishram* position what is the distance between the heels in inches?

(a) 10 (b) 12

(c) 16 (d) 18

Q4. In *Vishram* position what angle of degrees is formed?

(a) 50 (b) 30

(c) 20 (d) 10

Q5. In '*Vishram'*, the distance between both feet, at the heel, in inches is_____.

(a) 10 (b) 16

(c) 12 (d) 18

Q6. In *Savdhan* position, the hand should be in line with _____.

(a) Ground (b) Waist

(c) Shoulder (d) Stitching of the pants

Q7. In *Vishram* position, the Right palm should be _____ the left palm.

(a) Behind (b) Below

(c) In front of (d) To the right of

Q8. In *Vishram* position, the Right thumb should be _____ the left thumb.

(a) Behind (b) Below

(c) In front of (d) To the right of

Q9. In *Vishram* position, the weight of the body should be _____.

(a) On Right Leg (b) On both the legs

(c) Slightly in front (d) Slightly behind

Q10. In *Savdhan* position, the shoulder is to be_____ to the ground.

(a) Parallel (b) Perpendicular

(c) At 45 degrees (d) At 30 degrees

Q11. On the word of command, '*Ginti se Bayen Mud Ek',* you must turn, 90 degrees to Left, with the weight of the body on the _____ leg.

(a) Right (b) Both

(c) Left (d) All of these

Q12. On the word of command, '*Ginti se Dahine Mud Ek'*, you must turn, 90 degrees to Right, with the weight of the body on the _____ leg.

(a) Right (b) Both

(c) Left (d) All of these

Q13. *'Piche Mud'* is actually equal to _____.

(a) Two consecutive 'Dahine Muds'

(b) Two consecutive 'Bayen Muds'

(c) Both of these

(d) None of the above

Short Answer Questions

Q1. Where does any movement of the drill start from?

Q2. Why is Savdhan aur Vishram required?

Q3. Why is it necessary to turn standing and at what degree?

Q4. At what degree do we turn left and right?

Q5. Why is it necessary to turn backwards?

Q6. Write the word of command for the number of samples turning backwards?

Q7. Write the word of command for the number of samples turning right and left?

Long Answer Questions

Q1. Write in detail the things to be observed in *Savdhan* and *Vishram* position.

Q2. Write about right facing and left facing position.

Q3. Write the things to be observed in back facing position.

Q4. Why is there a need of half right and left facing?

Q5. Write the things to be observed in half right and left facing position.

FOOT DRILL (JD/JW)

CHAPTER FD III: KADWAR SIZING, TEEN LINE BANANA, KHULI AUR NIKAT LINE

"Never Stop Believing in your Abilities"

TEACHING INSTRUCTIONS

Periods : Three (03).

Type : Lecture and Practice.

Year : Ist Year - 02 Periods & IInd Year - 01 Period.

Conducting Officer: Permanent Instructor.

Training Aids : Chart, Black Board & Training Video.

Time Plan	**Ist Year**	**IInd Year**
• Introduction/Recapitulation (Theory)	: 10 Min	05 Min
• *Kadwar* Sizing (Practice)	: 20 Min	10 Min
• *Teen Line Banana* (Practice)	: 20 Min	10 Min
• *Khuli Line aur Nikat Line mein C*hal (Practical)	: 20 Min	10 Min
• Revision/Consolidation (Theory/Practical)	: 10 Min	05 Min

INTRODUCTION

1. A well sized squad, gives a good general view and impression to audience and provides the best chance to do the drill together. Sizing is done to have tallest on the right and shortest the left in a single file. On command for sizing, the whole squad turns right, counts and then sort themselves out by size, remaining at attention facing the instructor in one single line. The ***Kadwar*** parade and squad looks good when seen from a distance.

PREVIEW

This lecture will be conducted in three parts:-

- Part I : ***Kadwar Sizing***
- Part II : ***Teen line Banana***
- Part III : ***Khuli Line aur Nikat Line mein Chal***

LEARINNG OBJECTIVES

- Need of ***kadwar sizing***
- How to make ***teen line***
- ***Khuli line aur nikat line chal***

PART I: KADWAR SIZING

2. ***Kadwar Sizing***

(a) **Need**. ***Kadwar Sizing*** is always required in drill, especially for ceremonial drill. In this, the entire squad is made to stand in a line so that the taller ones stand to the right and the smaller ones stand to the left according to height, to give an orderly look to the Drill squad.

(b) **Demonstration by Statement and Count *(Bayan aur Ginti Se Namuna)***.

(i) In any formation, the standing squad gets the word of command to do the ***Kadwar Sizing***. On receiving the word of command "**Squad - *Lamba Dahine - Chota Bayen - Ek Line Mein Kadwar Khade* Ho"**, then the complete squad does ***Line Tod*** and the tallest cadet stands to the right while the rest of the cadets stand to his left according to decreasing height.

(ii) On receiving the word of command '***Squad Ginti Kar'*** , then start counting 1, 2, 3… from the tallest cadet on the right. On further receiving the word of command "***Visham Ek Kadam Aage aur Sam Ek Kadam Piche"*** the odd numbers take one step forward and even numbers take one step backwards.

(iii) On further receiving the word of command '**Number *Ek Khada Rahe*, *Visham Dahine aur Sam Bayen, Dahine Bayen Mud'* t**he squad does ***Tej Chal*** and one by one stand in threes behind the Number 1 Cadet. Number 1 cadet will be the first cadet of the first Line, Number 3 cadet will be the first cadet of the Middle Line and Number 5 cadet will be first cadet of the Last Line. In this manner the squad will be dressed with the taller cadets on the Left and Right and the shorter cadets in the center of the squad.

PART II: TEEN LINE BANANA

3. ***Teen Line Banana***.

(a) **Need**. When the number of personnels are more than nine, action is taken to form three files (lines).

(b) **Demonstration by Statement and Count *(Bayan aur Ginti Se Namuna)*.**

(i) When the word of command is received - No 1 ***Line Ban*** then as per procedure Number 2 cadet will stand behind Number 1 cadet and similarly Number 3 cadet will stand behind Number 2 cadet one step behind, do ***Tham*** and say 'Up'. They will then come to ***Vishram***. Then on receiving word of command Number 4 ***Line Ban,*** Number 4 cadet does ***Savdhan***, marches and stands left of Number 1 cadet at a distance of one arm length and says 'Up'. Number 5 cadet does similar action and stands to the left of Number 2 cadet while covering Number 4 cadet. In a similar manner the rest of cadets will continue the procedure.

(ii) If the squad has a strength of 11, 14, 17, 20, then always from the left, Number 2 file and middle line will have an empty space. If squad is of the strength of 10, 13, 16, 19, then from the left Number 2 file and Middle and Rear Line will have an empty space. If the squad has to be marched towards left or right then word of command will be '***Squad Teen O Teen Mein Dahine Baye Mud'***.

PART III: KHULI LINE AUR NIKAT LINE CHAL

4. ***Khuli Line Chal***.

(a) **Need.** When the squad has to conduct a weapon exercise or an important dignitary has to inspect during a Ceremonial Drill*,then '**Khuli Line Chal**'* is done.

(b) **Demonstration by Statement and Count *(Bayan aur Ginti Se Namuna)*.**

(i) When from *Savdhan* position word of command is received '***Ginti Se Chalna Khuli Line Chal - ek'***, then raise your left leg by 6 inches and put it ahead by 30 inches flat on the ground with the right feet toe firmly on the ground and heel lifted. In this position both the legs will be straight and tight and rest of the position will be like '***Savdhan'***.

(ii) When the word of command is received '***Squad Do'*** then raise your right foot by 6 inches and place it forward by 15 inches and align it with the heel of left foot and come to '***Savdhan'*** position. Keep in mind that you should have covered 45 inches from previous position and should be in '***Savdhan'*** position.

5. ***Nikat Line Chal***.

(a) **Need.** Once the inspection is over, then '***Nikat Line'*** is done before marching.

(b) **Demonstration by Statement and Count *(Bayan aur Ginti Se Namuna)***.

(i) When from '***Savdhan'*** Position you get a word of command '***Ginti Se Chalna Nikat Line Chal - Ek'***, to this command lift your left leg by 6 inches and place it 30 inches behind your right leg with your weight on your left leg and count ***Ek***. In this position, the whole left leg should be flat on the ground 30 inches behind the right foot with the right

heel on the ground and toe lifted. The rest of the position is similar to '***Savdhan'.***

(ii) When word of command is given '***Squad Do'*** then lift right leg 6 inches above the ground and stamp it 15 inches behind, aligned to the left foot. In this position, you will move 45 inches behind your previous position. The rest of the position is like '***Savdhan'.***

DID YOU KNOW?

- ***Kadwar Sizing*** is always required in drill, especially for ceremonial drill.
- When the number of personnels are more than nine, action is taken to form three files (lines).
- When the squad has to perform arms drill, or when the squad has to be inspected in a large parade, then '***Khuli Line'*** is done.
- During practice '***Khuli Line Chal'*** and '***Nikat Line Chal'*** is on voice count but on actual parade it is done without loud voice.

CONCLUSION

6. Sizing of the squad is required for ceremonial drill. The sized squad looks good when viewed from a distance. In this the whole squad is made to stand in a line so that the taller ones stand to the right and the smaller ones stand to his left as per the height. Cadets must be taught these basic Foot Drill movements to prepare them for Squad/Ceremonial Drill.

SUMMARY

- ***Kadwar Sizing*** is required in drill, especially for the ceremonial drill. In this the whole squad is made to stand in a line so that the taller ones stand to the right and the smaller ones stand to his left according to size. When the squad is to be inspected by VIPs on large parade or arms drill is to be practiced then '***Khuli Line Chal'*** is done.
- When the number of personnels are more than nine, action is taken to form three files (lines).

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. When is *Kadwar Size required*?

(a) Ceremonial drill (b) Foot drill

(c) Arms drill (d) Close drill

Q2. How many inches does one raise the left foot while doing *Khuli Line*?

(a) 6 (b) 8

(c) 10 (d) 9

Q3. How many inches behind should the left foot be placed in *Nikat Line*?

(a) 50 (b) 30

(c) 20 (d) 10

Q4. A line of men standing one behind the other is called _____.

(a) Lane (b) File

(c) Drill (d) Rank

Q5. During the process of *Kadwar Sizing* of a drill squad, all are made to stand in one line with the tallest standing at the _____.

(a) Left (b) Right

(c) Centre (d) Back

Q6. During the process of *Kadwar Sizing* of a drill squad, after all are made to stand in one line according to height and call out numbers, _____ is/are asked to step forward.

(a) Even Numbers (b) Every Third Number

(c) Odd Numbers (d) Whole Numbers

Q7. After completion of *Kadwar Sizing* of a squad, the right most rank of the squad will have the cadets who shouted the following numbers standing in sequence from the first line.

(a) 1,3 & 5 (b) 1,5 & 7

(c) 2,4 & 6 (d) Any of the above

Q8. After completion of *Kadwar Sizing* of a squad of 33 cadets, the left most rank of the squad will have the cadets who shouted the following numbers standing in sequence from the first line.

(a) 6,4 & 2 (b) 29,31 & 33

(c) 2,4 & 6 (d) 33,31 & 29

Q9. When the number of cadets is more than ___ a three-line squad is made.

(a) 12 (b) 8

(c) 15 (d) 9

Q10. When the number of cadets in a squad is 11, 14, 17, 20 etc, the second file from the left will have 'NO' cadet in _____ line.

(a) Middle and Last (b) Last

(c) Middle (d) First and Middle

Q11. When the number of cadets in a squad is 10, 13, 16, 19 etc., the second file from the left will have 'NO' cadet in _____ line.

(a) Last (b) Middle and Last

(c) Middle (d) First and Middle

Q12. In *'Khuli Line Chal'*, a cadet in front line will take a final position which is _____ inches in front of the original position.

(a) 30 (b) 90

(c) 60 (d) 45

Q13. In *'Nikat Line Chal'*, a cadet in middle line will take a final position which is _____ in relation from his/her original position.

(a) 45 inches ahead (b) 45 inches behind

(c) 30 inches ahead (d) None of these

Short Answer Questions

Q1. Why *Kadwar Sizing* is necessary?

Q2. When is three lines formed?

Q3. When is *'Khuli Line'* and *'Nikat Line'* required?

Q4. What is the word of command for *Kadwar Sizing*?

Q5. Write the points to be observed in position of *'Khuli Line'* and *'Nikat Line"*?

Long Answer Questions

Q1. Write in detail about *Kadwar Sizing*?

Q2. How are Three Lines made?

Q3. How is *'Khuli Line'* done?

Q4. What are the points to be kept in mind while doing *'Khuli Line'* and *'Nikat Line"*?

Q5. How is *'Nikat Line'* done?

FOOT DRILL (JD/JW)

CHAPTER FD IV: KHADE KHADE SALUTE KARNA

"We Salute the Rank not the Man"

TEACHING INSTRUCTIONS

Total Periods	: Two (02).
Type	: Lecture and Practice.
Year	: Ist Year - 01 Period & IInd Year - 01 Period.
Conducting Officer	: Permanent Instructor.
Training Aids	: Chart, Black Board & Training Video.

Time Plan		**Ist Year**	**IInd Year**
• Introduction/Recapitulation (Theory)	:	05 Min	05 Min
• ***Khade Khade Salute Karna*** (Practical)	:	10 Min	10 Min
• Practice (Practical)	:	20 Min	20 Min
• Revision/Consolidation (Theory/Practical)	:	05 Min	05 Min

INTRODUCTION

1. Salute is a formal way of showing respect in uniform. When we are standing at any place and any officer authorised a salute passes in front of us, then to give respect to him, we salute him while standing in front of him. Similarly, right salute and left salute are also given as per the position and direction in which the dignitary is standing.

PREVIEW

This lecture will be conducted in two parts:-

(a) Part I: ***Khade Khade Salute Karna***.

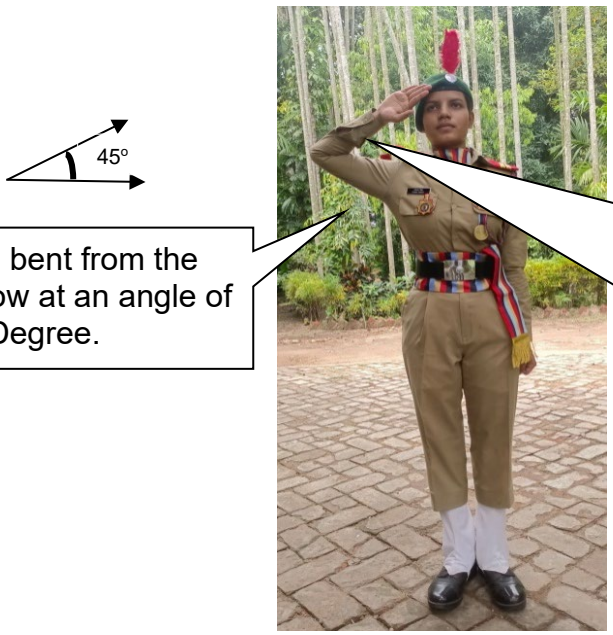
(b) Part II: ***Dahine/Bayen Salute***.

LEARNING OBJECTIVES

- Need *of* ***khade khade salute.***
- Demonstration with statement and count ***(ginti aur bayan ke saath namuna).***

PART I: KHADE KHADE SALUTE KARNA

2. **Need.** When we are standing at any place and any officer who is authorised to a salute passes in front of us, then to give respect to him, the act of saluting is done standing in front of him. Similarly, the act of right salute and left salute are also done.



3. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) On receiving the word of command "***Ginti se Salute Karna Samne Salute Ek"***, lift the right hand over the right shoulder from the side , bending from the elbow, place the right palm in such a manner that the Index Finger of the right hand is 1 inch above the right eyebrow. In this position all the fingers of your right hand should be together, Index Finger of right hand 1 inch above right eyebrow and arm bent from the elbow at an angle of 45°. The rest of the position is like ***Savdhan***.

(b) On receiving the word of command ***Squad Do***, bring down the right hand from the shortest route to your right side as in ***Savdhan*** position. The rest of the position is like ***Savdhan***.

PART II: DAHINE/ BAYEN SALUTE

4. ***Dahine/Bayen Salute***. It means Salute to the flank (right and left). ***Dahine ko Salute*** (Salute to the right) is best taught from the position of the salute to the front. Cadet takes his/her position of the salute to the front. He/she turns his/her head, eyes square off to the right, without upsetting the position of the right arm, wrist or hand and shifts the head so that right eye can just look along the palm of the hand. The cadet either looks along his/her own height or into the eyes of the dignitary he/she is saluting. For ***Bayen ko Salute*** (Salute to left), all actions are same except that cadet turns his/her head to the left.

DID YOU KNOW?

- Have you ever thought that the style of saluting of Indian Army, Navy and Air Force is different.
- Indian Army salutes by keeping the palm facing front. Navy salutes by lowering the palm. Air Force salutes with palm at an angle of 45 degree.
- In Indian Army, the palm facing front signifies the person saluting does not have a weapon, is harmless and can be trusted.

CONCLUSION

5. Salute is a formal way of showing respect in uniform. While standing, salute can be given to a person or a dignitary in front, right or left, while in ***Savdhan***.

SUMMARY

- When we are standing at any place and any officer who is authorised salute passes in front of us, then to give respect to him, the act of saluting is done standing in front of him. Similarly right salute and left salute are also performed.

- ***Khade Khade Salute*** is always given in ***Savdhan*** position.

- Things to look at and ensure in this position - fingers and thumb of the right hand are straight and joined. Index finger is 1 inch from the eyebrow of the right eye and right hand is bent at an angle of 45 Degrees from the elbow.

- In ***Dayen/Bayen Salute***, the head is turned to right/left with eyes looking onward the direction of salute. The hand, wrist and palm position remains the same as in salute facing from the front.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q 1. How many types of standing salutation movements are there?

(a) 5 (b) 4

(c) 3 (d) 2

Q 2. What is the angle between the wrist and the elbow when doing a salute?

(a) 50 (b) 30

(c) 45 (d) 15

Q 3. What is the distance of index finger of right hand from the eyes while saluting?

(a) 2 inch (b) 6 inch

(c) 5 inch (d) 1 inch

Q4. In front salute the angle formed at the right elbow is _____ degrees.

(a) 30 (b) 45

(c) 60 (d) 75

Short Answer Questions

Q1. Why is there a need to salute while standing?

Q2. What is difference in Salute in Indian Army, Navy and Airforce?

Q3. How many types of standing salutes are there in Foot Drill?

Q4. What are the words of command for saluting while standing?

Q5. How many movements are there in standing salute?

Long Answer Questions

Q1. Write in detail the general description of *Khade Khade Salute* in front, with count?

Q2. Write with description about standing *Samne Salute*?

Q3. Write with description about standing *Dahine Salute*?

Q4. Write with description about standing *Bayen Salute*?

Q5. What are the things to look for in a standing salute position?

FOOT DRILL (JD/JW)

CHAPTER FD V: PARADE PAR, VISARJAN AND LINE TOD

"Drill Requires Sacrifice"

TEACHING INSTRUCTIONS

Total Periods	:	Three (03).
Type	:	Lecture and Practice.
Year	:	Ist Year - 02 Periods & IInd Year - 01 Period.
Conducting Officer	:	Permanent Instructor.
Training Aids	:	Chart, Black Board & Training Video.

Time Plan		**Ist Yr**	**IInd Yr**
• Introduction/Recapitulation (Theory)	:	10 Min	05 Min
• Parade Par (Practical)	:	20 Min	10 Min
• Visarjan (Practical)	:	20 Min	10 Min
• Line Tod (Practical)	:	20 Min	10 Min
• Revision/Consolidation (Theory/Practical)	:	10 Min	05 Min

INTRODUCTION

1. When a platoon or troops standing in any formation near the edge of the drill ground and are required to be brought on parade then the word of command ***Parade Par*** is used. Before the platoon is brought on parade the right marker is nominated. In a squad the squad commander, in a platoon the platoon Havildar and in a company the CHM is the right marker. When the troops are not required to fallin again and officer is present on parade then ***Visarjan*** action is done. When troops are required to be rested for some time and fallin again then ***Line Tod*** is done.

PREVIEW

This lecture will be conducted in three parts: -

- **Part I: *Parade Par*.**
- **Part II: *Visarjan*.**
- **Part III: *Line Tod*.**

LEARNING OBJECTIVES

- **Need *for parade par, visarjan* and *line tod*.**
- **Demonstration by statement and count (*ginti aur bayan ke saath namuna).***

PART I: PARADE PAR

2. **Need**. In a situation when a platoon or troops standing in any formation near the edge of the drill ground are required to be brought on parade, then the word of command ***'Parade Par'*** is used. Before the platoon is brought on parade, the right marker is nominated. In a squad, the squad commander; in a platoon, the platoon Havildar and in a company the CHM is the right marker. When the troops are not required to fallin again, and officer is present on parade, then '***Visarjan'*** action is done. When troops are required to be rested for some time and again a fallin is to be done then the orders of '***Line Tod'*** is given.

3. **Demonstration by Statement and Count (*Bayan Aur Ginti se Namuna*)**.

(a) On receiving the word of command '***Squad Parade Par'*** the squad will move forward and do '***Tham'*** while taking alignment from Right Marker. They will then raise their right arm and get dressed and one by one put their arms down.

PART II: VISARJAN

4. **Need**. When there is no need to do fallin of the troops (cadets) again, and the officers are present for the parade, then '***Visarjan'*** is done.

5. **Demonstration by Statement and Count (*Bayan Aur Ginti se Namuna*)**.

(a) When from '***Savdhan'*** position word of command is received ***Squad/Platoon 'Visarjan'***, then turn right, salute and take three steps forward, do '***Tham'*** and keep moving straight. During practice turn left and remain standing in '***Savdhan'*** position.

PART III: LINE TOD

6. **Need**. When the squad is required to be given rest for a while and then are required to fallin again then ***Line Tod*** is done.

7. **Demonstration by Statement and Count (*Bayan Aur Ginti se Namuna*)**.

(a) The process of '***Line Tod'*** is similar to the one we have learnt for '***Visarjan'***, but salute will not be done on doing '***Line Tod'***.

CONCLUSION

8. When a platoon or troops standing in any formation near the edge of the drill ground are required to be brought on parade, then the word of command '***Parade Par'*** is used. Before the platoon is brought on parade the right marker is nominated. In a squad the squad commander, in a platoon the platoon Havildar and in a company the CHM is the right marker. When the troops are not required to fallin again and officer is present on parade then '***Visarjan'*** action is done. When troops are required to be rested for some time and fallin again then '***Line Tod'*** is done.

SUMMARY

- When a platoon or troops standing in any formation near the edge of the drill ground are required to be brought on parade then the word of command ***Parade Par*** is used.
- In a squad, the squad commander, in a platoon the platoon Havildar, and in a company the CHM is the right marker
- When the troops are not required to fallin again and officer is present on parade then ***'Visarjan'*** action is done.
- When troops are required to be rested for some time and fallin again then ***Line Tod*** is done.
- When from '***Savdhan'*** position the word of command '***Visarjan'*** is received , then turn right, salute, take three steps forward, and do ***Tham.*** Therefater keep moving straight.
- The process of ***'Line Tod'*** is similar to the one we have learnt for '***Visarjan'***, but salute will not be done on doing ***'Line Tod'***.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. What action is done to get cadets on parade?

(a) *Parade Par* (b) *Line Tod*

(c) *Visarjan* (d) None of these

Q2. What action is done to disperse cadets, not required to be fallin again?

(a) *Parade Par* (b) *Line Tod*

(c) *Visarjan* (d) None of these

Q3. What action is done when cadets are required to be rested for some time and fallin again?

(a) *Parade Par* (b) *Line Tod*

(c) *Visarjan* (d) None of these

Q4. Who is the Right Marker in a squad?

(a) Squad Cdr (b) Platoon Hav

(c) Company Commander (d) CHM

Q5. Who is the Right Marker in a platoon?

(a) Squad Cdr (b) Platoon Hav

(c) Company Commander (d) CHM

Q6. Who is the Right Marker in a company?

(a) Squad Cdr (b) Platoon Hav

(c) Company Commander (d) CHM

Q7. When from *Savdhan* position word of command is received cadets *Visarjan*, then:-

(a) Turn right & salute (b) Turn left & salute

(c) Move forward & salute (d) Move backward & salute

Q8. The process of *Line Tod* is similar to the one for *Visarjan*, except in *Line Tod……..:* -

(a) Salute will not be done (b) Turn left & salute

(c) Move forward & salute (d) Move backward & salute

Short Answer Questions

Q1. What is need for *Parade Par?*

Q2. What is need for *Visarjan?*

Q3. What is need *for Line Tod* ?

Q4. What is the difference between *Visarjan* and *Line Tod*?

Long Answer Questions

Q1. Write in detail about *Parade Par*.

Q2. Write in detail about *Visarjan*.

Q3. Write in detail about *Line Tod*.

FOOT DRILL (JD/JW)

CHAPTER FD VI: TEJ CHAL SE THAM AND DHIRE CHAL SE THAM

"Every day that you Don't practice, Someone Else Does"

TEACHING INSTRUCTIONS

Total Periods : Four (04).

Type : Lecture and Practice.

Year : Ist Year - 02 Periods & IInd Year - 02 Periods.

Conducting Officer: Permanent Instructor.

Training Aids : Chart, Black Board & Training Video.

Time Plan

		Ist Yr	IInd Yr
• Introduction/Recapitulation (Theory)	:	10 Min	10 Min
• ***Tej Chal aur Tham*** (Practical)	:	30 Min	30 Min
• ***Dhire Chal aur Tham*** (Practical)	:	30 Min	30 Min
• Revision/Consolidation (Theory/Practical)	:	10 Min	10 Min

INTRODUCTION

1. In order to go from one place to another in an orderly and disciplined manner, ***Tej Chal*** is done. The length of the step is 30 inches. The speed of steps for Regiment/Units is 120 steps in a minute, Rifle Units is 140 steps per minute, NCC Boy Cadets is 116 steps per minute and NCC Girl Cadets is 110 steps per minute. But, initially the recruits in Army march at a speed of 135 steps per minute.

PREVIEW

This lecture will be conducted in two parts:-

- **Part I : *Tej Chal aur Tham*.**
- **Part II : *Dhire Chal aur Tham*.**

LEARNING OBJECTIVES

- **Need of *tej chal aur tham* and *dhire chal aur tham*.**
- **Demonstration by statement and count (*ginti aur bayan ke saath namuna*).**
- **Practice.**

PART I: TEJ CHAL AUR THAM

2. **Need.** In order to go from one place to another in an orderly and disciplined manner, ***Tej Chal*** is done. The length of the step is 30 inches. The speed of steps for Regiment/Unit is 120 steps per minute, for Rifle Units it is 140 steps per minute, for NCC Boy Cadet it is 116 steps per minute and NCC Girl Cadets it is 110 steps per minute. But, during the initial part of training the recruits in Army march at a speed of 135 steps per minute.

3. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) When you get the word of command from '***Savdhan'*** position '***Ginti Se Chalna- Tej Chal- Ek'*** , then on this word of command place the left foot at a distance of 30 inches, the right arm to swing forward, in line with the shoulder, keep the left arm completely behind with fist closed, and watch the movement consciously till here. Things to observe in this position – the heel of the left foot is placed on the ground, toe raised, right foot completely on the ground, weight of the body on the right foot, both legs will be firm and taut without bending the knees, right arm in line with the shoulder and left hand behind, fists closed naturally. Rest of the position is as in '***Savdhan'*.**

(b) When you receive the word of command '***Squad Do'*** then on that word of command change feet and arms simultaneously and shout '***Do'*.** In this position, the right heel is touching the ground, the toe is raised, the left foot is completely on the ground and the weight of the body is on the left foot, the left arm is behind the right arm.

(c) When the word of command is received '***Squad Ek'*** then change arms and legs again.

(d) Word of command of '***Squad Tham'*** is given, when left foot is on the ground or when the right foot is crossing the left foot, keep the right foot at 30 inches for the entire length and shout '***Khali'.*** Then lift the left foot up and press down with the right foot, again quickly raising the right foot by 6 inches, placing it in '***Savdhan'*** position with the left feet and shout '***Ek-Do'***. Things to observe in this position is similar to as that in '***Savdhan'*** position.

PART II: DHIRE CHAL AUR THAM

4. **Need**. During ceremonial parades when the dignitary is inspecting the parade, the pilots marching ahead of the dignitary are required to do '***Dhire Chal'***. The length of the steps is 30 inches and the speed of the steps is 70 steps per minute.

5. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) When you get the word of command of '***Kadam Tol Kar Dhire Chalna - Bayan Paon Aage'***, then on this word of command move your left foot quickly by 15 inches, stop and shout ***Aage***. Things to look for in this position - the right foot should be completely on the ground and the weight of the body should be on the right foot; left foot should be 15 inches ahead of the right foot, toe along the ground and should be pulled towards the ground. The rest of the position is same as '***Savdhan'*** position.

(b) When you get the word of command '***Aage Badh'*** then on this word of command raise your left foot 15 inches further forward and place your toe first on the ground and shout ***Badho.*** Things to see in this position - The left foot is completely placed on the ground, the weight of the body is completely on the left foot, the toe of the right foot is on the ground, both the legs are raised and firm, the rest of the position is like ***Savdhan.***

(c) When you get the word of command '***Dahina Paon Aage',*** then move your right foot 15 inches forward from your left foot and shout ***Aage.***

(d) When you get the word of command, ***Aage Badh***, move the right foot further 15 inches forward and put the toes on the ground first and shout ***Badho***. This position is similar but opposite to left foot.

(e) When one gets the word of command '***Bayan Paon Aage'***, then take the left foot forward and shout Aage as done before.

(f) When the word of command '***Tham'*** is given at that time when the left foot is crossing the right foot or the right foot is on the ground, then taking the left foot 15 inches forward, lift and press it and quickly raise the right foot 6 inches and join it with the left foot and shout '***Ek-Do'***.

CONCLUSION

6. In ***Tej Chal*** **(Quick March),** Cadets should march from the position of ***Savdhan*** (applies to all occasions including ***Parade Par***) with natural swing from the shoulder, hands reaching as high as shoulder level in front and/to the rear. Hand kept closed and fingers slightly clenched always to the front should be maintained. Legs should be straight and the knees should not be bent, swinging forward freely and naturally from the hip joints.

7. In ***Dhire Chal (*****Slow March**), Cadet should move their left leg forward balancing on the right foot. The cadets should move left leg till it reaches right foot. Maintaining balance on right foot, the cadet should move the left leg further ahead and place left foot on ground. The distance of one pace is 30 Inch. Similarly, cadets should put the right foot ahead and halt. Hands should remain by the side of the body as in '***Savdhan'*** position.

SUMMARY

- To go from one place to another while maintaining discipline, ***Tej Chal*** is done. Speed of steps for NCC Boy Cadets is 116 steps per minute and for NCC Girl Cadets is 110 steps per minute. However, Army recruits in the initial phase of training march at a speed of 135 steps per minute.
- When any dignitary is inspecting the parade, the pilots ahead of the dignitary are required to do ***Dhire Chal***.
- ***'Tham'*** is given to stop any contingent during ***Tej Chal/Dhire Chal***.

FOOT DRILL (JD/JW)

CHAPTER FD VII: *TEJ CHAL SE MUDNA*

"Make Every Routine your Masterpiece"

TEACHING INSTRUCTIONS			
Total Periods	:	Four (04).	
Type	:	Lecture and Practice.	
Year	:	Ist Year - 02 Periods , IInd Year - 02 Periods.	
Conducting Officer	:	Permanent Instructor.	
Training Aids	:	Chart, Black Board & Training Video.	
Time Plan		**Ist Year**	**IInd Year**
• Introduction/Recapitulation (Theory)	:	20 Min	20 Min
• ***Tej Chal se Dahine Mudna*** (Practical)	:	20 Min	20 Min
• ***Tej Chal se Bayen Mudna*** (Practical)	:	20 Min	20 Min
• ***Tej Chal se Piche Mudna*** (Practical)	:	10 Min	10 Min
• Revision/Consolidation (Theory/Practical):		10 Min	10 Min

INTRODUCTION

1. When cadets are marching straight in the forward direction and have to change their orientation and direction by 90 degrees to the right or left then they are required to do ***Tej Chal se Dahine Mudna*** or ***Tej Chal se Bayen Mudna***. Similarly, if the cadets have to change their orientation by 180 degrees in the reverse direction then they will have to do ***Tej Chal se Piche Mudna***.

PREVIEW

This lecture will be conducted in three parts:-

- Part I : *Tej Chal se Dahine Mudna*.
- Part II: *Tej Chal se Bayen Mudna*.
- Part III: *Tej Chal se Piche Mudna*.

LEARNING OBJECTIVES

- Need and demonstration by statement and count
- *Tej chal se dahine mudna.*
- *Tej chal se bayen mudna.*
- *Tej chal se piche mudna*

PART I: TEJ CHAL SE DAHINE MUDNA

2. **Need.** When the cadets are marching straight in the forward direction and wish to change their direction and orientation by 90 degrees to the right then ***Tej Chal se Dahine Mudna*** is done.

3. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) When the cadets are marching forward in '***Tej Chal'*** and receive a word of command '***Ginti se Mudna Dahine Mud - Ek'*** - this word of command will be given when right foot is crossing the left foot or left foot is on the ground. On this word of command the right foot is placed 15 inches ahead on the ground and the orientation is changed to the right and shout *Ek*. In this position right foot should be on the ground, weight on the toe of right foot, heel of the right foot raised, left hand ahead and right hand behind as in marching position.

(b) On receiving the word of command '***Squad Do'***, then on this word of command left foot should be lifted ahead as in ***Kadam Tal***, take the hands as in '***Savdhan'*** position and shout ***Do***. Point to remember in this position is that right foot should completely be on the ground, weight on right foot while left foot should be in position of ***Kadam Tal*** and rest of the position as in '***Savdhan'***.

(c) When the word of command '***Squad Teen'*** is received**,** then turn on the heel of right foot by 90 degrees, get the left leg in '***Savdhan'*** position and shoot the right leg 15 inches ahead as in ***Kadam Tal*** and shout ***Teen***. In this position left foot should be completely on the ground, weight on left foot, right foot ahead by 15 inches as in ***Kadam Tal*** and rest of the position is similar to '***Savdhan'***.

(d) When the word of command '***Squad Char'*** is received, then shoot the right foot 15 inches forward with the heel on the ground and commence ***Tej Chal*** simultaneously shouting ***Badho***

PART II: TEJ CHAL SE BAYEN MUDNA

4. **Need**. When cadets are marching forward and wish to change their direction and orientation by 90 degrees to the left then ***Tej Chal se Bayen Mudna*** is done.

5. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) While marching when cadets receive the word of command '***Ginti se Mudna Bayen Mud – Ek'***, then this word of command is given when the left foot is crossing the right foot or the heel of the right foot is touching the ground. On this word of command the right foot is placed 15 inches ahead on the ground and stop in the marching position and shout ***Ek***. In this position left foot should completely be on the ground, weight on left foot, toe of the right foot on the ground with heel raised, right arm in front and left hand behind as in ***Tej Chal***.

(b) On receiving the word of command '***Squad Do'***, right foot is lifted as in ***Kadam Tal*** , hands as in '***Savdhan'*** position, and shout *Do*. In this position left foot should completely be on the ground, weight on left foot, right foot as in ***Kadam Tal*** and rest of the position as '***Savdhan'***.

(c) When cadets get the word of command '***Squad Teen',*** then they turn 90 degrees on the heel of left foot, get the right foot to '***Savdhan'*** position and shoot the left foot forward by 15 inches as in ***Kadam Tal***. The rest of the position is like '***Savdhan'***.

(d) On receiving the word of command '***Squad Char'***, the left foot is moved 15 inches forward with the heel touching the ground first and continue ***Tej Chal*** while shouting ***Badho***.

PART III: TEJ CHAL SE PICHE MUDNA

6. **Need**. When while marching forward cadets wish to change their orientation and formation by 180 degrees to the rear direction then ***Tej Chal se Piche Mudna*** is done.

7. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) When cadets are marching in ***Tej Chal*** and receive the word of command '***Ginti se Mudna Piche Mud - Ek'*** - this word of command is given when the left foot is crossing the right foot or the heel of the right foot is on the ground. On receiving this word of command, move right foot forward by 15 inches as in marching position and stop while shouting *Khali Ek*. This position is similar to the first movement of ***Dahine Mud***.

(b) On receiving the word of command '***Squad Do'***, then turn of the heel of the right foot towards the right by 90 degrees and get the left foot close to right foot as in '***Savdhan'*** position and shout ***Do***. This position is similar to '***Savdhan'*** but the orientation must change by 90 degrees to the right.

(c) On receiving the word of command '***Squad Teen'*** then on the right toe of left foot turn 90 degrees to the right simultaneously, lift the right foot by 6 inches coming to '***Savdhan'*** position while shouting ***Teen.*** This position is similar to '***Savdhan'***.

(d) On receiving the word of command '***Squad Char'***, correct the position and direction by lifting the left leg by 6 inches and placing close to right leg as in '***Savdhan'*** position. This position is similar to '***Savdhan'*** but the orientation has changed by 180 degrees.

(e) When cadets receive the word of command '***Squad Panch'***, then cadets must shoot their left foot forward by 30 inches, start ***Tej Chal*** while shouting ***Badho***.

CONCLUSION

8. When cadets are marching in the forward direction and want to change their orientation by 90 degrees to the right or left then they will be required to do ***Tej Chal se Dahine Mudna*** and ***Tej Chal se Bayen Mudna***. Similarly, if they wish to change their orientation by 180 degrees in the reverse direction, then they will have to do ***Tej Chal se Piche Mudna***.

SUMMARY

- When cadets are marching in the forward direction and want to change their orientation by 90 degrees to the right or left then they will be required to do Tej Chal se Dahine Mudna and Tej Chal se Bayen Mudna. Similarly, if they wish to change their orientation by 180 degrees in the reverse direction, then they will have to do Tej Chal se Piche Mudna.

- When cadets are marching forward and wish to change their direction and orientation by 90 degrees to the right then ***Tej Chal se Dahine Mudna*** is done.

- When cadets are marching forward and wish to change their direction and orientation by 90 degrees to the left then ***Tej Chal se Bayen Mudna*** is done.

- When while marching forward cadets wish to change their orientation and formation by 180 degrees to the rear direction then ***Tej Chal se Piche Mudna*** is done.

FOOT DRILL (JD/JW)

CHAPTER FD VIII: TEJ CHAL SE SALUTE KARNA

"Practice with Intensity, Compete with Integrity, lose with Dignity Win with Humility"

TEACHING INSTRUCTIONS

Total Periods : Five (05).

Type : Lecture and Practice.

Year : Ist Year - 02 Periods & IInd Year - 03 Periods.

Conducting Officer: Permanent Instructor.

Training Aids : Chart, Black Board & Training Video.

Time Plan		**Ist Yr**	**IInd Yr**
• Introduction /Recapitulation (Theory)	:	10 Min	15 Min
• Tej Chal se Samne Salute (Practical)	:	20 Min	30 Min
• Tej Chal se Dahine Salute (Practical)	:	20 Min	30 Min
• Tej Chal se Bayen Salute (Practical)	:	20 Min	30 Min
• Revision/Consolidation (Theory/Practical)	:	10 Min	15 Min

INTRODUCTION

1. Whenever we have to interact with any Senior Armed Forces Officer or any distinguished dignitary, to give them respect, we salute them smartly. Similarly while marching, when the squad passes in front of the reviewing dais the squad commander gives a salute while on the march. Salutes are reciprocated at the highest levels upto and including Heads of States and are indicative of a feeling of mutual trust and respect. Thus we can say that Salute is a courteous exchange of greetings between junior and senior ranking individuals and it is also rendered to the National Flag as a sign of respect.

PREVIEW

This lecture will be conducted in three parts:-

- **Part I: Tej Chal se Samne Salute Karna.**
- **Part II: Tej Chal se Dahine Salute Karna.**
- **Part III: Tej Chal se Bayen Salute Karna**

LEARNING OBJECTIVES

- **Understand and learn *tej chal se salute karna***

PART I: TEJ CHAL SE SAMNE SALUTE KARNA

2. **Need.** Saluting is a military custom by which respect is given to a superior rank or a dignitary and also to greet or acknowledge their presence . Salute is also rendered to the National Flag as a sign of respect.

3. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*).**

(a) When from ***Tej Chal*** cadet gets a word of command '***Ginti se Salute Karna Samne Salute - Ek'***. This word of command is given in a similar manner as while doing ***Tham*** in ***Tej Chal***. This position is similar to '***Savdhan'***.

(b) When you get a word of command '***Squad Do'***, on this word of command, do '***Samne Salute'*** once. In this position cadet should have completed the ***Samne Salute*** and the rest of the position is same as '***Savdhan'***.

(c) When cadet gets a word of command '***Squad Teen'***. On this word of command, do ***Samne Salute*** once again. The rest of the position is like ***Savdhan***.

(d) When the word of command '***Squad Char'*** *is given*, then on this word of command ***Piche Mud is done***. In this position cadets direction should have changed by 180 degrees. The rest of the position is like '***Savdhan'***.

(e) When the cadet gets the word of command '***Squad Panch'***, then the cadet starts ***Tej Chal*** and shouts ***Badho***.

PART II: TEJ CHAL SE DAHINE SALUTE KARNA

4. **Need.** When a cadet is marching and any Officer or a dignitary is passing from the right then the cadet is required to do ***Dahine Salute***.

5. **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*).**

(a) When from ***Tej Chal*** a cadet gets a word of command ***Ginti se Salute Karna Dahine Salute - Ek,*** then cadet is required to do ***Dahine Salute***. This word of command is given when right foot is crossing the left foot or heel of left foot is on the ground. On receiving this command, as the heel of the left feet touches the ground, the cadet turns their head right, salutes and stops while shouting ***Khali Ek***. In this position heel of the left foot should be on the ground, right foot completely on the ground, weight on right foot, both legs are firm and taut, salute as per procedure, eyes completely right and rest of the position like in ***Savdhan***.

(b) When cadet gets a word of command ***Squad Do,*** then, on the right foot start the count from 2 and count till 5 while continuing to march and then stop. The count should be like '***Squad Do' - Do - Teen - Char - Panch***. In this position the cadet should have covered five steps forward and rest of the position is like described above.

(c) On receiving the word of command ***Squad Teen,*** the cadet takes the right foot forward with the heel touching the ground and simultaneously looks straight and drops the salute (saluting hand) while shouting **down**. In this position the heel of the right foot should be 30 inches ahead, toe up, weight on left foot, salute down and rest of the position like ***Savdhan***.

(d) When cadet gets the word of command ***Squad Char*** , then commence ***Tej Chal*** from left foot and shout ***Badho***.

PART III: TEJ CHAL SE BAYEN SALUTE KARNA

6. **Need**. When a cadet is marching and any Officer or a dignitary is passing from the left, then the cadet is required to do ***Bayen Salute***.

7 **Demonstration by Statement and Count (*Ginti aur Bayan se Namuna*)**.

(a) When from ***Tej Chal*** a cadet gets a word of command ***Ginti se Salute Karna Bayen Salute – Ek,*** then cadet is required to do ***Bayen Salute***. This word of command is given when right foot is crossing the left foot or heel of left foot is on the ground. On receiving this command as the heel of the left foot touches the ground the cadet turns the head left, salutes and stops while shouting ***Khali Ek***. In this position heel of the left foot should be on the ground, right foot completely on the ground, weight on left foot, both legs are firm and taut, salute as per procedure taught, eyes completely left and rest of the position like ***Savdhan***.

(b) When cadet gets a word of command ***Squad Do*** then on the right foot start the count from 2 and count till 5 while continuing to march and then stop. The count should be like '***Squad Do' - Do - Teen - Char - Panch***. In this position a cadet should have covered five steps forward and rest of the position is like described above.

(c) On receiving the word of command ***Squad Teen***, the cadet takes the right foot forward with the heel touching the ground and simultaneously looks straight and drops the salute (saluting hand) while shouting **down**. In this position the heel of the right foot should be 30 inches ahead, toe up, weight on left foot, salute down and rest of the position like ***Savdhan***.

(d) When a cadet gets the word of command ***Squad Char,*** then commence ***Tej Chal*** from left foot and shout ***Badho***.

CONCLUSION

8. A salute is imparted to Senior Armed Forces Officer or any distinguished dignitary, to give them respect. Similarly while marching, when the squad passes in front of the reviewing dais the squad commander gives a salute while on the march. Salutes are reciprocated at the highest levels upto and including Heads of States and are indicative of a feeling of mutual trust and respect. Thus we can say that Salute is a courteous exchange of greetings between junior and senior ranking individuals. Salute is also rendered to the National Flag as a sign of respect.

SUMMARY

- Whenever a cadet or a junior has to talk to any Officer or a dignitary, or if these dignitaries have called for any interaction, then they are saluted smartly as a mark of respect. Similarly, while marching when the squad passes in front of the reviewing dais the squad commander gives a salute while marching.

- When a cadet is marching and any officer/rank holder is passing from the right, then a ***Dahine Salute*** is required to be done.

- When a cadet is marching and any officer/rank holder passes from the left ,then ***Bayen Salute*** is required to be done.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. How many movements are there in *Tej Chal se Samne Salute*?

(a) 5 (b) 4
(c) 3 (d) 2

Q2. How many inches does the feet extend while doing *Tej Chal se Dahine Salute*?

(a) 30 (b) 20
(c) 10 (d) 12

Q3. What is the angle between the right hand and the elbow while doing *Dahine salute*?

(a) 45 (b) 30
(c) 20 (d) 25

Q4. How many movements are there in *Tej Chal se Bayen Salute*?

(a) 4 (b) 5
(c) 7 (d) 2

Q5. On which foot is the word of command *Dahine Salute* given?

(a) On right foot (b) On left foot
(c) Both feet (d) None of these

Q6. How many types of *Khali Hath Salute* are there?

(a) 3 (b) 5
(c) 7 (d) 2

Q7. During *Tej Chal*____ movements are taken for *Dahine Salute*.

(a) 3 (b) 4
(c) 5 (d) 6

Q8. During *Tej Chal*____ movements are taken for *Bayen Salute*.

(a) 3 (b) 4
(c) 5 (d) 6

Q9. During *Tej Chal* the Word of Command of *Bayen Salute* is given on ____ leg.

(a) Left (b) Right

(c) Both (d) None of these

Q10. During *Dahine Salute/ Bayen Salute* how many steps do we move in *Tej Chal*?

(a) 8 (b) 4

(c) 5 (d) 6

Short Answer Questions

Q1. Why *Samne Salute is* needed?

Q2. Why *Tej Chal se Dahine Salute* is needed?

Q3. What are the things to look for when doing *Samne Salute*?

Q4. When do we do *Bayen Salute*?

Q5. How many times should we salute in *Samne Salute*?

Long Answer Questions

Q1. Write down the procedure for *Samne Salute*?

Q2. Write down the procedure for *Tej Chal se Dahine Salute?*

Q3. Explain *Bayen Salute*.

Q4. What are the points to be kept in mind in *Dahine Salute*?

Q5. What are the points to be kept in mind in *Bayen Salute*?

FOOT DRILL (JD/JW)

CHAPTER FD IX: INDIVIDUAL WORD OF COMMAND

"Discipline is the Bridge between Goals and Success"

TEACHING INSTRUCTIONS

Total Periods : Two (02).

Type : Practice.

Year : II nd Year - 02 Periods.

Conducting Officer: Permanent Instructor.

Training Aids: Chart, Black Board & Training Video.

Time Plan **IInd Year**

- Introduction (Theory) : 10 Min
- Words of Command (Practical) : 30 Min
- Practice (Practical) : 30 Min
- Revision/Consolidation (Theory/Practical) : 10 Min

INTRODUCTION

1. A good word of command depends upon the voice **tone** and **pitch**. **Correct** word of command is given in **clear** and **loud** voice. A good word of command is **promptly** acted upon.

PREVIEW

This lecture will be conducted in two parts:-

- Part I : ***Words of Command ki Jankari***.
- Part II: DST Procedure

LEARNING OBJECTIVES

- Know about word of command.
- Practice DST procedure.

PART I: WORD OF COMMAND

2. A correct word of command depends on the **"tone and pitch"** of the voice. A good word of command is given in a **"clear and loud voice"** so that it is implemented immediately. The following things are important for giving a good word of command:-

(a) **Loudness (*Swar*).** The loudness of word of command depends upon how many people are receiving the same and what is their distance from the commander. For giving a word of command the commander always positions him self in **front** of the squad and in the **centre**. Word of command is always given in ***Savdhan***.

(b) **Clarity (*Spashta*).** Clear word or command is given when there is correct coordination between the **tongue, lips** and the **teeth**.
A clear word of command will be **promptly** acted upon.

(c) **Pitch**. For correct word of command the **correct pitch** is essential.

(d) **Timing**. For prompt action to a word of command correct timing is essential. A word of command has two parts ie. **Cautionary** and **Executive**. Cautionary command is given as the preparatory command for the cadet to be ready for the Executive command which is the actual command to which a cadet has to respond. There should be a difference of **four *Tej Kadam*** steps between **Cautionary** and **Executive** words of command. In ***Tej Chal ,*** **Cautionary** word of command starts from the **right foot**. There should be a **three** Second gap between the '**Cautionary**' and '**Executive**' word of command.

3. Following words of commands are used in drill:-

(a) ***SAVDHAN*** *and* ***VISHRAM.***

(b) ***DAHINE MUD*** *and* ***BAYEN MUD.***

(c) ***PICHE MUD*** *and* ***AAGE MUD.***

(d) ***DAHINE DEKH*** *and* ***BAYEN DEKH.***

(e) ***TEJ CHAL, DHIRE CHAL*** *and* ***THAM.***

(f) ***KHULI LINE CHAL*** *and* ***NIKAT LINE CHAL.***

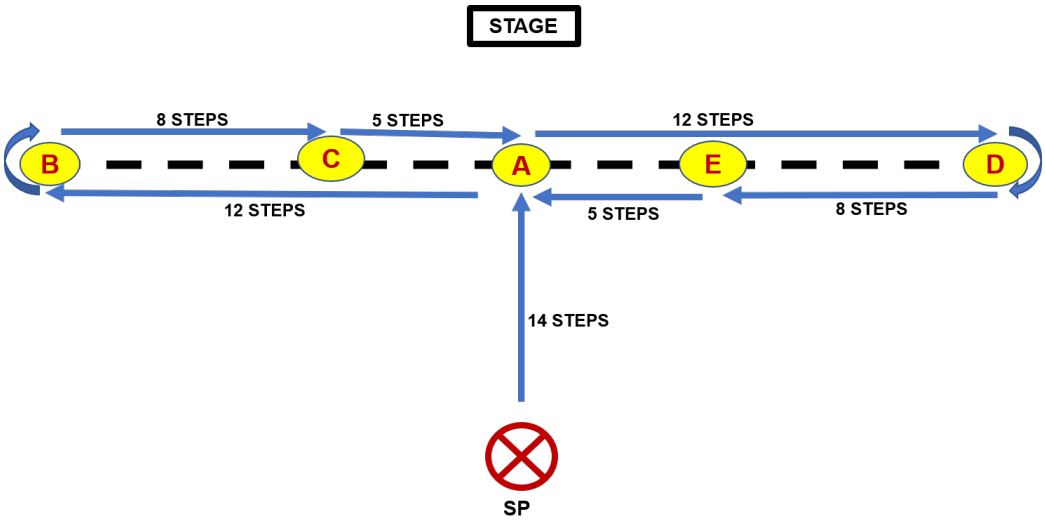
(g) ***LINE BAN, SAJ JA*** *and* ***VISARJAN.***

(h) ***DAHINE SALUTE, BAYEN SALUTE*** *and* ***SAMNE SALUTE***.

PART II: DRILL SQUARE TEST (DST) PROCEDURE

4. **Need**. After the completion of drill training, cadets have to undergo Drill Square Test to find out the level of efficiency acquired by **the cadets in drill.**

5. Demonstration with Statement**.**



Diagrammatic Layout of DST Procedure

(a) Get in ***Savdhan*** position.

(b) On the order of ***Shuru Karo,*** march 14 steps with ***Tej Chal*** and do ***Tham***.

(c) **Salute** and give report to the instructor. ***No_____ Cadet_____ DST Ke Liye Hazir Hai Shriman***.

(d) Do ***Dahine Mud***, one-time **Bayen *Mud***, ***Picche Mud*** and again ***Pichhe Mud***.

(e) Then the drills of ***Khuli Line*** and ***Nikat Line Chal*** is done***.***

(f) Do 12 Steps ***Tej Chal*** and ***Pichhe Mud*** and after 8 Steps do ***Bayen Salute*** with ***Tej Chal***. Salute down after 5 steps.

(g) Continue with ***Tej Chal*** and after 12 steps do the drill of ***Pichhe Mud***. Again after 8 x steps do ***Dahine Salute*** and salute down after 5 steps with ***Tej Chal***.

(h) **Continue with *Tej Chal* and after 4 steps do *Tham*. Do *Bayen Mud* followed by *Line Tod*.**

CONCLUSION

6. A good word of command depends upon the voice **tone** and **pitch**. **Correct** word of command is given in **clear** and **loud** voice. A good word of command is promptly acted upon.

SUMMARY

- A good word of command depends upon the voice **tone** and **pitch**. **Correct** word of command is given in **clear** and **loud** voice. A good word of command is **promptly** acted upon.
- For giving a word of command the commander always positions himself in **front** of the squad and in the **centre**.
- A word of command has two parts. viz **Cautionary** and **Executive**.
- There should be a difference of four '***TEJ CHAL'*** steps between **Cautionary** and **Executive** words of command.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Correct word of command depends on?

(a) Clarity (b) Timing

(c) Pitch (d) All of the above

Q2. Word of commands are of_____ types.

(a) 3 (b) 4

(c) 2 (d) 5

Q3. Good word of command depends on?

(a) Tone and pitch (b) Voice and timing

(c) Clarity and pitch (d) None of the above

Q4. A properly delivered 'Command' is _____ and distinct enough to be clear and understood by every one.

(a) Slow (b) Heavy

(c) Long (d) Loud

Q5. Word of Command is always given in ____ position.

(a) Savdhan (b) Vishram

(c) Front (d) Janch

Q6. The Number of gap in 'Paces' between 'Cautionary' and 'Executive' Word of Command is_____.

(a) 3 (b) 1

(c) 2 (d) 4

Q7. There should be a _____ Second gap between the Cautionary' and 'Executive' word of command.

(a) 1 (b) 2

(c) 3 (d) 4

Q8. After getting the order of Shuru Kar how many steps does a cadet march before doing Tham?

(a) 10 steps (b) 12 steps

(c) 14 steps (d) 16 steps

Q9. What is the full form of DST?

(a) Drill Square Test (b) Drill Step Test

(c) Dahine Step Test (d) Drill Square Time

Short Answer Questions

Q1. What does a good word of command depend upon?

Q2. What are the types of word of command?

Q3. What all should be adhered for giving Clear word of command ?

Q4. Word of Command should be given from which place ?

Q5. Explain any one type of word of command.

Long Answer Questions

Q1. What do you understand by following in word of command?

(a) Loudness

(b) Clarity

(c) Pitch

(d) Timing

Q2. How many types of words of command are there in drill. Explain.

Q3. Make a diagram of DST procedure

WEAPON TRAINING JW/JD

2

CHAPTER WISE INDEX : WEAPON TRAINING (WT)

WEAPON TRAINING (JD/JW)

CHAPTER WT I : INTRODUCTION TO THE POINT 22 RIFLE

"Amateurs train until they get it right, professionals train until they can't get it wrong"

TEACHING INSTRUCTIONS

Period	:	One (01)
Type	:	Lecture cum Practice
Year	:	1st Year
Conducting Officer	:	Permanent Instructor.

Training Aids : Class Room, Open Training area or Ground, Script or Book Flagged or Lesson Plan in File, Board and Markers, .22 Rifles all types (01 each).

Time Plan

- Introduction : 05 Min
- Specifications of .22 Rifle (All Types) : 15 Min
- .22 Ammunition & Types : 15 Min
- Conclusion : 05 Min

INTRODUCTION

1. Hunting as a means of survival has been man's basic instinct from time immemorial. Earlier men used various types of weapons to hunt, starting gradually with bows and arrows to modern day weapons. In modern world, shooting is an exciting sport and shooting at the ranges not only helps an individual to master this sport but also gain confidence in himself. The fine art of shooting, teaches a person precision, accuracy, co-ordination of body movements, patience and confidence, all of which accrue good results in public life too with a better personality. For an NCC Cadet, introduction to weapon kindles his interest towards firing as a sport and also motivates the individual to join the Armed Forces. Hence a basic understanding of weapons is essential for Cadets.

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I : Introduction.**
- **Part II : Types of Ammunition.**

LEARNING OBJECTIVES

- **Basic understanding of the point 22 rifle.**
- **Specifications of the different types of point 22 rifles used in NCC for training.**
- **Visual handling of the weapon.**
- **Understanding about the ammunition and its types.**

INTERESTING FACTS

- Popular Caliber The Point 22 Long Rifle (LR).
- Dates back to the late 19th century.
- Point 22 LR was introduced in 1887 by the Stevens Arms Company.
- Used in training due to their manageable recoil and cost effectiveness, making them ideal for learning marksmanship.

PART I : FAMILIARISATION OF POINT 22 RIFLE

2. The Point 22 Rifle (also depicted as .22 Rifle) is a light weight and an uncomplicated weapon. Because of its simple design and virtually no recoil, this weapon is used by NCC for firing. Like any other firearm, it is important that before using the weapon, the basic information of this weapon is available to the users.

3. **Specifications of the Point 22 Rifle**.

Details	Rifle Point 22" No II MK IV BA	Rifle Point 22" Deluxe BA	Rifle Point 22" Sporting BA
Length	45 inches	43 inches	43 inches
Weight	3.93 Kg	2.78 Kg	3 kg
Magazine Capacity	10 Rounds	05 Rounds	10 Rounds
Muzzle Velocity	2700 feet per second	2700 feet per second	2700 feet per second
Grooves in the barrel	06	06	06
Effective Range	25 yards (23 meters)	25 yards (23 meters)	25 yds (23 meters)
Max Range	1700 yds at 33^{o} angle (1550 meters)	1700 yds at 33^{0} angle (1550 meters)	219 yards (200 meters)
Caliber	Point 22"	Point 22"	Point 22"
Ammunition	Point 22"	Point 22"	Point 22"
RATE OF FIRE			
Normal	05 rounds per minute	05 rounds per minute	05 rounds per minute
Rapid	**10-15 rounds/minute**	**10-15 rounds/ minute**	**10-15 rounds/ minute**

4. **Types of .22 Rifles Used in NCC**. Presently, three types of .22 Rifles are in use in the NCC.

(a) **Rif .22 No II Mk IV BA**

(b) **Rif .22 mm Deluxe BA**

(c) **Rif .22 Sporting BA**

5. **Parts of a .22 Rifle**. Parts of a .22 Rifle are shown below.

DESCRIPTION OF PARTS : POINT 22 RIFLE

1. **Sight.** Device used for aiming usually by aligning a front and rear sight.

2. **Muzzle**. The end of the barrel through which the projectile(bullet or shot) exits.

3. **Barrel**. Metal tube through which the projectile travels.

4. **Forestock**. Front portion of the stock extending under the barrel in front of the receiver, usually held by the non-trigger hand to help support the firearm.

5. **Magazine**. Container on a repeating firearm that holds ammunition before it's loaded into the chamber, usually tubes or boxes attached to the receiver.

6. **Trigger**. Small lever that is squeezed to start the firing process.

7. **Trigger Guard**. Piece that surrounds the trigger to protect it from being squeezed or bumped accidentally.

8. **Butt**. The part of the stock you hold against your shoulder.

9. **Stock**. Handle of Firearm.

10. **Safety**. Mechanical device that blocks the trigger or hammer to prevent accidental firing.

11. **Bolt Handle**. Handle used to open a bolt action.

12. **Bolt**. Moveable metal block that seals a cartridge into the chamber on some actions.

13. **Chamber**. Base of the barrel used to hold the cartridge or shoft shell ready for shooting.

PART II : TYPES OF AMMUNITION

6. **General :** Ammunition, also known as ammo is the material fired, scattered, dropped or detonated from any weapon or weapon system. The term Ammunition include the component parts of weapons that create the effect on a target (e.g., bullets and warheads). The purpose of ammunition is to project a force against a selected target to have an effect (usually, but not always lethal). Ammunition consists of a cartridge case which has 2 components, propellant and a bullet. As the propellant burns, the bullet is pushed with extreme force towards the target. Ammunition design has evolved over a period of time as weapon designs have become more refined. Starting with the gunpowder in the 13th century, the first cartridge made of paper, were developed in the 1500's which was later replaced by brass. The bullets earlier were "round lead balls". By the 19th century, bullets developed for rifled barrels became more aerodynamic and accurate.

7. **What is a bullet?**

A Bullet is a metal projectile for firing from a rifle, revolver, pistol or other firearms. Typically cylindrical and pointed. There are various types of ammunition in the present era. Some of them are elucidated below:-

(a) **Round Nose:** The end of the bullet is blunted.

(b) **Hollow Point:** There's a hole in the bullet that creates expansion when a target is struck.

(c) **Jacketed:** The soft lead is surrounded by another metal, usually copper, that allows the bullet to penetrate a target more easily.

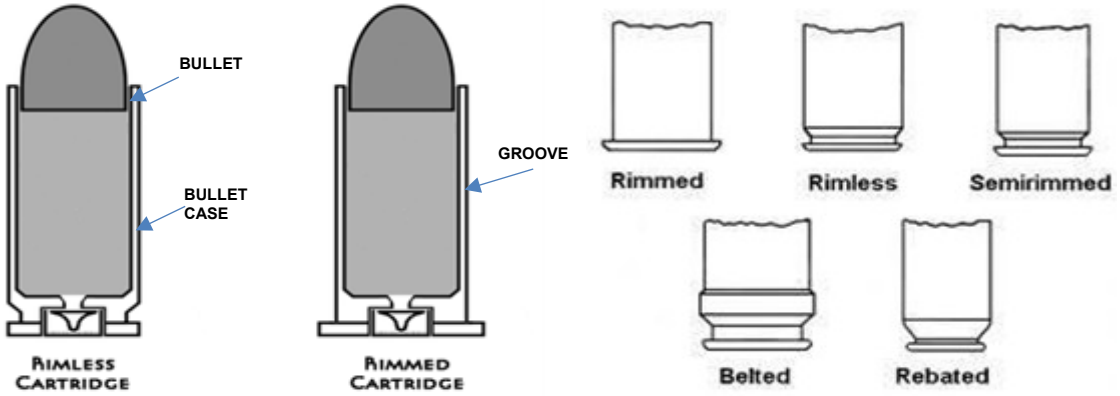
(d) **Point 22 Rifle Ammunition**

(i) The term .22 refers to the diameter of the bullet, which is approximately 0.22 inches (5.6mm). This measurement defines the caliber of the ammunition and corresponds to the size of the barrel through which it is fired.

(ii) The .22 ammunition was first developed in 1857 in USA.

POINT 22 AMMUNITION SPECIFICATIONS	
Caliber	Point 22 inch
Length of Bullet	10 mm
Length of Bullet with Case	15 mm
Weight	38/40 gm
Type of Bullet	Lead / Copper
Type of Ammunition	Rim / Rimless

DIAGRAMMATIC REPRESENTATION OF RIMLESS AND RIMMED AMMUNITION



8. **Difference Between Rimless and Rimmed Ammunition.**

(a) Rimmed cartridges have a rim which helps in extraction by the extractor. It engages the rim at the base of the shell which is significantly wider than the body of the cartridge.

(b) A rimless cartridge has a groove (as shown in the pic above) just above the end of the cartridge for the extractor to help in extracting. The bottom of the cartridge has the same diameter or are a little smaller (rebated) than the main body.

CONCLUSION

9. The Point 22 rifle is a highly effective and a reliable weapon. Easy to assimilate, it is the ideal weapon to start training with.

10. Cadets can achieve remarkable firing skills with good knowledge and handling of this weapon.

11. Keen students under an able instructor will have a lot to gain from this chapter.

12. Knowledge of the weapon would lead the Cadets to learn the 'BASICS' properly and thereafter gradually with more practice turn into a Marksman.

SUMMARY

- The Rifle .22 No II Mk IV BA and .22 Deluxe BA are used in NCC training.
- Both have following characteristics:
  - Caliber .22-inch LR.
  - Muzzle Velocity- 2700 feet per second. Groove: 6 Nos.
  - Effective Range- 25 yards (23 mtrs).
  - Safety : On rear end top of the body by pushing the lever forward
- Both rifles differ in their length, weight, and magazine capacity.
- These weapons fire both .22 Rimmed and Rimless ammunition.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Length of .22 Rifle Mk-IV BA is

(a) 45 Inch (b) 43 Inch

(c) 14 Inch (d) 25 Inch

Q2. Which is not a part of .22 Rif?

(a) Bore (b) Recoil Spring

(c) Bolt (d) Piston

Q3. Effective range of .22 Rifle is _____.

(a) 50 Yds (b) 25 Yds

(c) 11 Yds (d) 23 Yds

Q4. Muzzle velocity of 0.22 rifle is _____.

(a) 2400 feet/ second (b) 1100 feet/second

(c) 2700 feet/ second (d) 2300 feet/ second

Q5. Magazine capacity of .22 Deluxe rifle magazine is _____.

(a) 05 Rounds (b) 10 Rounds

(c) 15 Rounds (d) 20 Rounds

Q6. Weight of .22 Deluxe Rifle _____.

(a) 3.6 Kg (b) 3.69 Kg

(c) 2.78 Kg (d) 3.68 Kg

Q7. How many types of ammunition are fired using the .22 Rif?

(a) 2 (b) 4

(c) 1 (d) 6

Q8 .22 Rifle was invented by which country?

(a) Russia (b) Israel

(c) India (d) USA

Q9. Normal rate of fire of .22 Deluxe is _____.

(a) 3 rounds per minute (b) 5 rounds per minute

(c) 10 rounds per minute (d) 12 rounds per minute

Q10. A primary weapon of a soldier is _____.

(a) Rifle (b) Pistol

(c) LMG (d) Mortar

Q11. .22 Rifle Mk-IV BA and Deluxe differ in _____.

(a) Length (b) Caliber

(c) Muzzle Velocity (d) Rate of Fire

Q12. Length of Bullet in .22 ammunition is _____.

(a) 05 mm (b) 10 mm

(c) 15 mm (d) 20 mm

Q13. Length of Bullet with case in .22 ammunition is _____.

(a) 05 mm (b) 10 mm

(c) 15 mm (d) 20 mm

Q14. Weight of .22 ammunition is _____.

(a) 30/32 gms (b) 35/37 gms

(c) 38/40 gms (d) 45/47 gms

Q15. No of Grooves in the barrel of .22 Rifle _____.

(a) 4 (b) 5

(c) 6 (d) 7

WEAPON TRAINING (JD/JW)

CHAPTER WT II : HANDLING OF POINT 22 RIFLE

“"It is not the weapon that kills, but the hand and the mind that holds it."

TEACHING INSTRUCTIONS

Period	:	Three (03)
Type	:	Lecture cum Demo/ Practice
Year	:	1st Year - 02, 2nd Year - 01
Conducting Officer	:	Permanent Instructor.

Training Aids : Open Training area or Ground, Lesson Plan in File, Board and Markers, .22 Rifles for Squad Post Training.

Time Plan		**Ist Year**	**IInd Year**
• Introduction	:	05 Min	05 Min
• Handling of .22 Rifle	:	25 Min	10 Min
• Striping & Assembly	:	25 Min	10 Min
• Firing Positions	:	20 Min	10 Min
• Conclusion	:	05 Min	05 Min

INTRODUCTION

1. A good firer is the one, who can quickly load the magazine into Rifle, aim and fire it effectively. This can only be possible when the firer has learnt the correct procedures and carried out extensive practice during training. It is therefore important that a Cadet with practice is capable of handling the weapon in different firing positions. He should also be aware of the various parts of a Rifle and should know how to strip and assemble it. The more a Cadet dwells on these aspects, the better he or she will be in handling, and effectively using the weapon during firing practices.

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I : Handling of .22 Rifle (Loading, Unloading, Aiming & Trigger Operation).**
- **Part II : Assembling & Stripping.**

LEARNING OBJECTIVES

- **Basic handling of the .22 rifle**
- **Loading & firing**
- **Aiming & trigger operation**
- **Stripping and assembling**
- **Firing positions**

INTERESTING FACTS

Shooting with both eyes open many shooters are taught to shoot with one eye closed for better focus. However, advanced shooters often keep both eyes open, which provides better peripheral vision and situational awareness in defensive situations.

PART I : HANDLING OF A POINT 22 RIFLE

2. Handling the Rifle entails **Holding, Loading, Cocking, Aiming, Trigger Operation, Firing and Unloading** the weapon while adopting various **Firing Positions**. It also entails **Stripping** & **Assembling** the weapon for cleaning and learning purposes.

3. **Loading.** In the Point 22 Deluxe Rifle, ammunition is filled one by one in the Magazine and then the Magazine is pressed into the slot made below the Rifle. Ensure that the ammunition is clean before loading. If Magazine is not available, then after assuming the firing position, the cocking handle is pulled back, the round is manually loaded into the chamber and the cocking handle is pushed forward.

4. Loading of ammunition must be carried out only on 'Orders', and no action should be taken without proper 'Orders'. Loading must be carried out properly and in a set sequence. The drill and the sequence to load a weapon using lying position is illustrated below:-

(a) To assume lying position, take a long pace forward with the left foot and at the same time pass the Rifle into left hand, holding it at the point of balance.

(b) Place the right hand on to the ground in line with the left foot. During this movement push the Rifle forward and lower it to the ground. The left arm will now be extended to the front. The legs must be keptl apart.

(c) Keep the Rifle on the right hand and move the elbow of the left hand until the target, left elbow, right shoulder and right leg come in a line. Now keep the right elbow at the place where the elbow is to the right and slightly below the shoulder.

(d) Place the palms of both hands below the chin, close your eyes and feel the tension of the elbow. If there is tension in the elbow, then keep the elbow in the same place and move the elbow back and forth to remove the tension and mark the place of the elbow.

(e) Once the position is taken, the filled magazine is loaded or the ammunition is loaded one by one directly into the chamber after every round is fired.

5. **Holding**. To take hold of the Rifle, push it into the shoulder very firmly. Place the Rifle at the '**V**' position formed between the pen finger and thumb of the left hand. The hand guard should come over the right hand. All four fingers should be placed from the outside, and the thumb from the inside along with the magazine. If the Rifle is pointing upwards, move the right hand forward.

If the Rifle is pointing down, move the right hand backward. If it is pointing to the left then move the body position to a little right. If it is pointing to the right then move the body position to a little left.

6. **Aiming**. Accuracy of the aim is essential for a successful shot. This is by far the most difficult operation, as the eye has certain limitations. Nevertheless, good shooting can only be obtained with consistency of aim. Normally 25 yds range is used for Deluxe .22 Rifle. The thumb rule for correct aim is as enumerated below:-

(a) Focus on the target so that a clear picture is formed on the retina of the eye and one gets the true center of the target.

(b) Hold the Rifle properly as taught, keep it upright and firm, aligned to the target.

(c) Close the left eye and focus on the foresight with the right eye.

(d) See the foresight through the back sight 'U'. The foresight should be seen clearly in the center of the U. The tip of the foresight must be aligned in the center and in level with the shoulder of the U.

(e) This line formed, should further align with the point of aim.

7. **Trigger Control**. The third essential for accurate shooting is trigger operation. It should be done without disturbing the Aim. To achieve this, perfect co-ordination between eye, brain and operation of the forefinger on the trigger is required. It is achieved by conscious control of the body and thorough practice. It entails, independent action of the index finger, muscular control of the hands, holding of breath/ breath control (before pressing the trigger), co-ordination between the right eye, brain and right-hand index finger and an element of '**holding'** which essentially means hold the stance for as long as possible.

8. **Firing a Shot**. Accurate shooting can never be achieved without concentration. From the time correct holding is achieved, more than **five seconds** should not be taken to fire a shot. Dwelling too much on the aim causes the eye and muscles to tire which may result in inaccurate shooting. When the '**range'** is given, the firer should adjust the sights and await indication of the target. The sequence of firing a shot is given below:-

(a) **Position**. On being ordered to get ready, the firer must take the firing position.

(b) **Limber-Up**. Before any firing practice, it is advisable to carry out trigger operation exercise and sequence of action for firing a shot. This is termed as '**Limber-Up'** and its aim is to assist in coordination and tuning up of muscles, eye and brain.

(c) **Bhar**. Cadet should load the ammunition, take aim and be ready to fire on orders 'Bhar'.

(d) **Breathing**. Just before taking an aim, breathing must be gently restrained. It is important to coordinate, so that when the foresight comes to the point of aim, the breath is partially exhaled.

(e) **Firing**. On being ordered to Fire, the Cadet should press the trigger. For a second or two after firing, there should be no relaxation of the 'hold' or 'movement of trigger finger' or 'head'.

(f) **Follow Through**. The 'hold' on the weapon and 'point of aim' must be maintained until the bullet has left the barrel. Better still, firer should follow through until the bullet has reached the target.

(g) **Re-loading**. Immediately after follow through, on orders, reloading should be carried out.

(h) **Re-alignment**. Having reloaded, the firer should realign his sights approximately on the target and be ready to fire the next round.

9. **Unloading**. Once firing is over, order for "***Khali kar***" will be given. The magazine should be removed. The chamber be checked by pulling the cocking handle back. After this the weapon be cocked twice and on orders the trigger should be pressed keeping the rifle towards the target. On further orders, place the right hand on the ground below the right shoulder, draw up the left hand and stand up as quickly as possible.

10. **Safety Precautions**. Safety assumes paramount importance while handling any weapon. Ensuring this entails:-

(a) Pushing forward the safety catch, raising and drawing back the bolt knob, then examining the chamber and the magazine. When satisfied that both are clear, push the bolt knob forward and down, press the trigger again keeping the rifle towards the target and apply the safety catch.

(b) Inspecting the drill cartridges and ensuring that there is no live ammunition left or stuck in the barrel.

PART II : STRIPPING & ASSEMBLY

11. **Stripping**. Before stripping, check that the number on the left side of the body corresponds with the number on the back side of the lever of the bolt. The removal is done in the following sequence:-

(a) Removal of the bolt is done by raising the back sight leaf and pushing forward the safety catch. Keep the left hand under the magazine with the middle finger on the restraining catch. Withdraw the bolt to the rear, turning the bolt head upwards and fold back the back sight.

(b) Press the magazine catch upwards and take out the magazine.

12. **Assembling**. The assembling of the Rifle is always done in the reverse order. Check the magazine and ensure that the magazine number is the same as that of the Rifle. Insert the magazine at its place and press it. Ensure that the magazine is fixed in its place. While assembling the bolt of Deluxe .22 Rifle the following points will be borne in mind:-

(a) Bolt head to be fully tight.

(b) Bolt head and guide rib as well as cocking piece and steel lug to be in one line.

(c) Number inscribed on the bolt should tally with that inscribed on the Rifle.

(d) Safety catch should be applied.

(e) Insert the bolt by holding bolt lever with right hand and Rifle with the left. Push forward the bolt until it touches in the charger guide and turn the bolt head towards right till the click sound is heard. Now push forward, and press the trigger and apply the safety catch.

(f) Set the sight by pressing the thumb spring with range increasing towards the muzzle side (adjust the thumb spring accordingly).

13. **Care and Cleaning**. The efficiency of the Rifle depends on two factors.

(a) Maintenance of the Rifle.

(b) Skill of the firer.

14. The Rifle is designed to stand up to active service conditions but performance will be considerably affected if it is subjected to unduly harsh conditions. Strip the Rifle, open the butt trap and remove the pull through and the oil bottle for cleaning. The pull through has three loops. Nearest the weight is for the guage, the center for cleaning the barrel with flannelette and the end one for oiling the barrel and for use of the armourer. Cleaning to be

carried out on following occasions:-

(a) **Before Firing**. Clean the barrel to make it oil free. After every practice, use the pull through to keep the barrel clean from carbon deposit.

(b) **After Firing**. Once firing is over, use the pull through to first clean the barrel of any soot, followed by using oil to keep it rust free. Open the parts and clean them before depositing the weapon in the Kote.

(c) Apart from the above, in order to keep the weapon in a fit state to fire, weekly, monthly and quarterly cleaning should be carried out.

CONCLUSION

15. Having learnt the characteristics of .22 Rifle, the Cadets in this chapter have gone ahead and learnt about handling the weapon.

16. Easy to handle, it is the ideal weapon to start firing with.

17. On learning the process of stripping and assembling the weapon, the Cadets are now ready to handle the weapon and ensure its serviceability.

18. The importance of cleaning a weapon at various stages and the process of cleaning having been taught to the Cadet, they are now well versed to maintain it well.

SUMMARY

In this Chapter the focus is on several key aspects.

- **Handling the .22 Rifle**. The chapter emphasizes safe handling practices, including always treating the Rifle as if it is loaded.
- **Stripping and Assembly**. The chapter outlines the steps for safe assembling and stripping of the .22 Rifle. It highlights the importance of keeping parts clean and how and when to clean the weapon.
- Overall, the chapter aims to provide a comprehensive understanding of safe and effective Rifle handling and maintenance.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. .22 Rifle has _____ parts.

(a) 12 (b) 18

(c) 15 (d) 14

Q2. How can ammunition be loaded into the rifle?

(a) Magazine (b) Manually into the chamber

(c) Both of the above (d) None of the above

Q3. When a firer is uphill and target is downhill then which position is the best for sighting the target?

(a) Standing position (b) Lying position

(c) Kneeling position (d) Sitting position

Q4. During firing, if the Rifle suddenly stops firing then what procedure is carried out?

(a) Pressing Trigger (b) Removing Magazine

(c) Put Rifle down (d) Opening Rifle

Q5. After loading, the next step is ____.

(a) Holding (b) Fire

(c) Cocking (d) Khali kar

Q6. What is most important for firing?

(a) Correct aiming (b) Holding tight

(c) Correct trigger operation (d) All of these

Q 7. Which part of the .22 Rifle is stripped first?

(a) Bolt (b) Magazine

(c) Re-Coil Spring (d) Receiver cover

Q8. When range is given, the firer will _____

(a) Press trigger (b) Cock the weapon

(c) Adjust the sight (d) None of the above

Q9. On order of ready, the firer will _____

(a) Take firing position (b) Cock the weapon

(c) Press the trigger (d) None of the above

Q10. When do we need to clean a Rifle?

(a) Before putting in Kote (b) Before firing

(c) After firing (d) All of these

Q11. The efficiency of the Rifle depends on_____.

(a) The maintenance given to the Rifle (b) The skill of the firer

(c) All the above (d) None of the above

Q12. Aim of _____ is to assist in coordination and tuning up of muscles, eye and brain.

(a) Breathing (b) Trigger Control

(c) Both of the above (d) Limber Up

Q13. Before firing, the barrel should be ____.

(a) Cleaned and oil be applied (b) Cleaned and oil be removed

(c) Not cleaned (d) None of the above

Q14. After firing, the barrel should be ____.

(a) Cleaned and oil be applied (b) Cleaned and oil be removed

(c) Not cleaned (d) None of the above

Q15. Cdt should load the weapon on orders of_____.

(a) Fire (b) Khali Kar

(c) Bhar (d) Ready

Short Answers Question

Q1. Note the steps in sequence of firing a shot.

Q2. How does one carry out proper aiming?

Q3. Write a short note on loading.

Q4. When should cleaning be carried out?

Q5. What does ensuring safety while firing entail?

WEAPON TRAINING (JD/JW)

CHAPTER WT III : FIRING POSITIONS AND TYPES OF FIRE

“"In the hands of a skilled marksman, the bolt-action rifle is more than a weapon-it is an extension of patience, control, and mastery."

TEACHING INSTRUCTIONS

Period : One (01).

Type : Lecture cum Demo/ Practice.

Year : 1st Year

Conducting Officer : Permanent Instructor.

Training Aids : Open Training area or Ground, Lesson Plan in File, Board and Markers, .22 Rifles for Squad Post Training.

Time Plan

- Introduction : 05 Min
- Firing Positions : 15 Min
- Types of Fire : 15 Min
- Conclusion - 05 Min

INTRODUCTION

1. In order to fire effectively, a good firer needs to take the most appropriate fire position. This can only be possible when the firer has learnt the types of firing practices during training. The various positions enable a firer to use the best possible position based on the terrain. Having learnt the basic handling, the cadets now need to become proficient in the various firing positions which will enable them to carry out various types of firing practices.

PREVIEW

The lecture will be conducted in the following parts:

- **Part I : Firing Positions.**
- **Part II : Types of Firing Practices**

LEARNING OBJECTIVES

- **Understanding all types of firing positions & practices**
- **Understand the types of firing practices**
- **Basic handling of the .22 rifle**
- **Loading & firing**
- **Aiming & trigger operation**
- **Stripping and assembling**

INTERESTING FACTS

Rifle-firing Technique

- Breathing
- Relaxation
- Aim
- Squeeze the trigger
- Squeeze more for follow-through

Shooting with Both Eyes Open

Many shooters are taught to shoot with one eye closed for better focus. However, advanced shooters often keep both eyes open, which provides better peripheral vision and situational awareness in defensive situations.

PART I - FIRING POSITIONS

2. **Firing Positions**. You can fire from a .22 Rifle by assuming four firing positions. Keep in mind that holding, aiming and trigger operation should be correct in all of these.

3. **Lying/Prone Position**. The prone position is a Rifle firing position where the shooter lies on the ground. It is considered the most accurate and stable position for shooting. Main characteristics of this position are as under:-

(a) **Stability**. The prone position offers maximum body support and stability.

(b) **Accuracy**. It is the most accurate position for long-distance shots.

(c) **Ease of Learning**. It is the easiest position to master and is often the first position learned.

(d) **Fundamentals**. It is the best position for learning the fundamentals of firing such as aiming, breath control and trigger operation.

4. Here are some tips for using the prone position:-

(a) **Body Position**. Angle your body to the left axis of the Rifle if you are right-handed. Keep as much of your body in contact with the ground as possible.

(b) **Support**. Use a bipod if available, or put a soft rest under your front hand or under the Rifle fore-end.

(c) **Muzzle**. Pay special attention to the muzzle of your Rifle, as there is greater risk that it will touch the ground.

(d) **Rising**. Before rising or getting up, place the Rifle on the ground, stand up, then pick up the Rifle.

(e) **Vision**. The low angle of the prone position may limit your view of the target if there are tall grasses or bushes in-between. It is therefore important to clear the field of view before proceeding with this firing practice.

5. **Kneeling Position.** The kneeling position is a firing position where the shooter sits on the heel of one foot and places the other foot pointing forward towards the target. Here are some tips for kneeling position while firing:-

(a) **Elbow Placement**. For right-handed shooters, place the left elbow on the left knee. For left-handed shooters, place the right elbow on the right knee.

(b) **Supporting Arm**. Place the elbow under the Rifle or against the body.

(c) **Use a Sling**. A sling can help create a stable position.

(d) **Use a Stick or Bipod**. If possible, use a stick or extended bipod to steady the front hand and Rifle.

(e) **Pivot Point**. Think of the belt buckle as the pivot point. To engage another target, shift the entire body.

(f) **Relax**. Relax in the position and open the eyes to see where the target is in relation to the foresight tip.

(g) **Freeze**. Imagine the entire body as frozen to stay in its natural position to get correct point of aim.

6. There are two types of kneeling positions:-

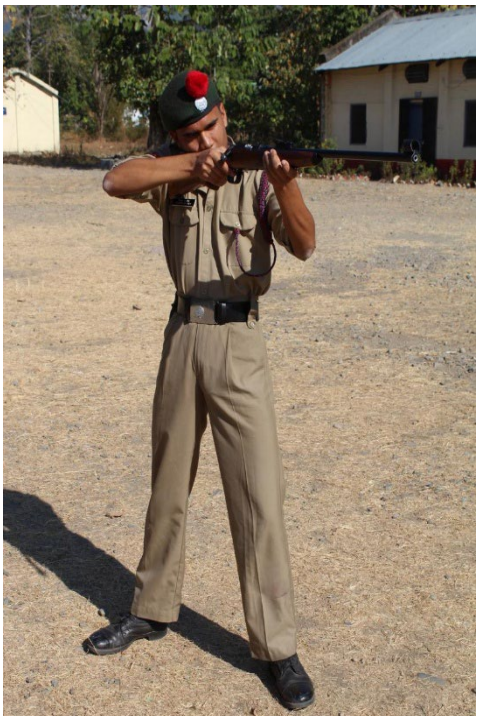
(a) **High Kneeling**. Sit on the heel of the foot, with the shooting-side elbow more horizontal.

(b) **Low Kneeling**. Sit on the side of the foot, with the shooting-side foot forward.

7. **Standing Position**. Standing position is a Rifle shooting position that is considered the most challenging and requires a lot of practice. Here are some tips for the standing position:-

(a) **Stance**. Stand perpendicular to the target with your feet shoulder-width apart and pointing slightly away from the target.

(b) **Arm Position**. For right-handed shooters, the left hand holds the fore stick with the elbow pointing down, and the right hand holds the grip with the elbow pointing out. The supporting arm should be perpendicular to the firearm, with the forearm resting in the supporting palm. The supporting elbow can rest on your hip or rib cage.



(c) **Body Position**. Keep your body upright and your legs straight with soft knees.

(d) **Stability**. For more stability, you can place a fist or grip the Rifle near or under the trigger guard. You can also use a stick or sticks that are perpendicular to the Rifle to increase stability.

(e) **Natural Point of Aim**. It is important to find your natural point of aim, which is where your body naturally aims at while aiming downrange.

8. There are two main forms of the standing position: **the supported and free-arm positions**. In the **supported position**, also known as the "**arm-rested position**", one puts the elbow of the non-firing hand against one's hip. In the **free-arm position**, one **leans forward with his/her arms out in front**.

9. **Sitting Position.** The sitting position is a steady shooting position that involves supporting both arms with one's legs. Here are some tips for firing in the sitting position:-

(a) **Leg position.** One can sit with one's legs apart or crossed. If with legs are apart, one can dig one's heels into the ground.

(b) **Arm position**. Rest the elbows on the inside of the knees, or in front of them if flexible. Avoid letting the elbows touch the kneecaps.

(c) **Body position**. Lean forward to rest on the legs. Turn the body 45–60 degrees away from the target.

(d) **Rifle position**. Place the butt stock of the Rifle on the right shoulder, close to the neck. Hold the Rifle's pistol grip firmly in the right hand to support the trigger finger.

(e) **Face position**. Place the face firmly against the stock, with the dominant eye looking through the sights.

(f) **Sling**. Use a sling to support the Rifle. Place the sling across the back of the left hand, and then across the chest and behind the left arm.

(g) **Steady the Rifle**. Use a stick or extended bipod to steady the fore-end of the Rifle.

Note: This position is only for teaching purpose, however, this firing position is generally not adhered to, either for practice or for any competition.

PART II - TYPES OF FIRING PRACTICES

Zeroing.

10. Before the start of firing, it is important to ensure that the rifle is 'Zeroed'. Zeroing ensures that the centre of the group formed aligns with the point of aim (centre of the target). A firer is generally given five shots to fire from 25 metres and make the smallest group possible, without changing the point of aim. After the fire, the sights are adjusted horizontally (windage) and vertically (elevation) in such a manner that subsequent groups are formed at the centre of the target.

11. Although the Open Sight Range has the variables of 100 meters, 75 meters, 50 meters and 25 meters, but Firing in NCC is always restricted to 25 meters other than the competitions like IDSSC where the firing is done at 50 meters. However, the Zeroing will always be carried out at 25 meters.

Grouping

12. For the purpose of training, a '**Group'** will imply five consecutive well-fired shots, fired with consistent aim at the same aiming point/mark. The central point of impact is the Mean Point of Impact (MPI) of the **Group**.

Grouping Capacity

13. The diameter of a circle containing all five shots, fired by the firer to the best of his ability, is known as his 'grouping capacity'.

14. For the purpose of coaching and scoring, firers are classified into certain grouping capacities and measured at a range of 25 meters. These capacities are represented by the diameter of the circles e.g. 2 inches, 4 inches and so on. The smallest Group thus formed is considered the best.

15. A firer's grouping capacity, while remaining fairly constant at any given range, varies in proportion to the range at which firing is taking place. Thus, once a firer's grouping capacity at 100 yards/25 metres has been ascertained, his capacity at any other range can be calculated by simple arithmetic. Hence, should the group be centrally placed, the scores

expected on target can also be predicted.

16. It must be appreciated that a 'Group' is representative of a firer's capacity, only when correct aim has been taken for every shot. Should a firer accidentally fire when aim is not correct, he must note very carefully where the sights were pointing at the moment of firing and declare the fact. If on checking it is found that a bullet has gone astray and not at the place declared by the firer, it should be ignored for judging his grouping capacity. For instance, if a firer was making a 4 inches group and because of one stray bullet he makes a 12 inches group, his grouping capacity will be considered as 4 inches only.

Application

17. Once the grouping capacity of the firer is assessed, it will be his duty not only to maintain this capacity, but to improve on it too, eradicating any faults he might have had in earlier shoots. The cadets are put through the application firing practice.

18. In the context of range firing, application of fire involves using controlled fire in various training scenarios like Target Practice, Fire Control Techniques, Live-Fire Exercises, Safe Handling and Operation of Firearms including how to manage misfires or other dangerous situations, Ballistic Testing and Tactical Drills.

19. Overall, the application fire in range firing is focused on skill development, safety and tactical effectiveness. As elucidated earlier, when firing a series of shots with a supposedly constant aim and under the same conditions, all rounds will not hit the same spot, however perfect the firer, the weapon and its ammunition. A pattern will always be formed.

Snap Shooting

20. After grouping and application fire has been done, snap shooting should be carried out. This is to defeat the time factor. Initially it should be carried out on miniature range to make the firer realize that the exposure of target is enough to get a deliberate round fired and he must be perfectly calm and collected throughout. In fact, before he is made to fire, he should be given enough practice on the following aspects:-

(a) Concentration.

(b) Speed up co-ordination between eye and hand.

(c) Practice in dominating impulse.

21. The practice is given in the following stages:-

(a) **Stage 1. Automatic Alignment**. The aiming mark is given at the instructor's eye when the squad is lying in semi-circle with instructor in the center. The alignment is checked with the help of aiming disc when the individual on the command `up' aims at the eye of the instructor.

(b) **Stage 2. Automatic Alignment with Correct Hold and Trigger Operation**. On the command 'up' the firer brings up the rifle, aims, holds the rifle correctly and takes the shot. He reloads when the rounds would have left the barrel for certain (It is best to emphasize this by a distinct pause), comes down and declares his shot- if incorrect to the instructor. There is no time limit initially, only '**accuracy before speed**'

is insisted. Later in this stage, indication with a finger is given and thus raising of the finger is the signal for the firer to fire his round. Sight impulse thus replaces sound impulse.

(c) **Stage 3, 4 & 5**. Practice firing is done at figure targets 11, 12 and snap shooting at ranges 100, 200 and 300 yards.

(d) For firing on miniature range representative figure targets are used and the time progressively reduced from 7 to 4 seconds. The size of the target is also reduced. Not more than two practices should be carried out in a day. Here again accuracy before speed will be insisted upon. Good holding is essential.

(e) **Stage 6.** Practice is given at range sighting at figure 11 & 12 targets.

(f) **Stage 7.** The range snap shooting practice is carried out.

Continuous Snap Shooting.

22. The targets need to be engaged as they appear. The time will come in battle when the firer is confronted with a number of enemies within killing range. His task will be to account for as many as possible, before they escape to cover or alternatively get to close quarter battle. The guiding principle is, always '**Shoot to Kill'**. In this case, having killed one enemy, he must at once engage another, firing continuously and methodically as long as target remains. The main points to be considered here are:-

(a) Accuracy is not sacrificed for speed.

(b) There is no verbal declaration of aim, since this would cause distraction.

(c) The butt remains on the shoulder in order to save time in re-aiming.

(d) Perfect bolt manipulation to ensure that no time is wasted in reloading.

(e) Firing will continue until such time as the command 'Stop' is given, or no further fire is required.

CONCLUSION

23. Point 22 Rifle is a very efficient weapon with the help of which the cadets are taught how to fire properly.

24. By knowing the correct position, the cadets can be made to realize the importance of taking appropriate position as per the terrain and target.

25. The types of firing practices that can be done with this weapon and it's usage by cadets can transform them into good firers.

26. It is essential that good firers are identified and further given additional training in application and snap shooting.

SUMMARY

In this Chapter the focus is on the following key aspects:-

- **Firing Positions**. It covers various firing positions, such as prone, sitting, kneeling, and standing. Each position is explained in terms of stability and aiming techniques.

- **Firing Practices**. The chapter outlines the types of firing with the .22 rifle. It highlights the importance of these practices and understanding how each is to be carried out.

- Overall, the chapter aims to provide a comprehensive understanding of firing positions and the types of practices involved.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Which is the most accurate and stable firing position?

(a) Prone (b) Standing

(c) Sitting (d) Kneeling

Q2. Which is the most challenging and difficult firing position?

(a) Prone (b) Standing

(c) Sitting (d) Kneeling

Q3. When a firer is standing in uphill and target is downhill then which position is better for illuminating the target?

(a) Standing position (b) Lying position

(c) Kneeling position (d) Sitting position

Q4. There are ____ types of kneeling positions.

(a) 1 (b) 2

(c) 3 (d) 4

Q5. How many types of firing position are there?

(a) 3 (b) 4

(c) 5 (d) 2

Q6 Which firing practice is carried out first.

(a) Grouping (b) Application

(c) Snap Shot (d) Any of these

Q7. Grouping fire should be carried out from __ yards for best result.

(a) 25 (b) 50

(c) 100 (d) Any of these

Q8. Snap shooting is carried out in how many stages?

(a) 7 (b) 6

(c) 4 (d) 5

Q9. Firing will be done in lying position when the target is _____.

(a) Near (b) Far off

(c) Right side (d) Out of weapon range

Q10. The diameter of a circle containing all five shots, fired by the firer to the best of his ability is called _____

(a) Grouping Capacity (b) MPI

(c) Group (d) all of these

Q11. In prone position the firer is_____.

(a) Lying (b) Standing

(c) Sitting (d) Kneeling

Q12. In ____ firing position the elbow is placed on the knee.

(a) Prone (b) Standing

(c) Sitting (d) Kneeling

Q13. In grouping fire, ____ rounds should be fired.

(a) 5 (b) 4

(c) 3 (d) 2

Q14. _____ fire involves using controlled fire in various training scenarios.

(a) Application (b) Grouping

(c) Snap Shooting (d) None of the above

Q15. The central point of all five shots fired by the firer is called ____.

(a) Grouping Capacity (b) MPI

(c) Group (d) All of these

Short Answer Questions

Q1. Write the list of main characteristics of prone position.

Q2. What is grouping and MPI?

Q3. Why is prone the most accurate position for shooting?

Q4. Explain the types of Kneeling position.

Q5. Name the types of firing positions.

Long Answer Question

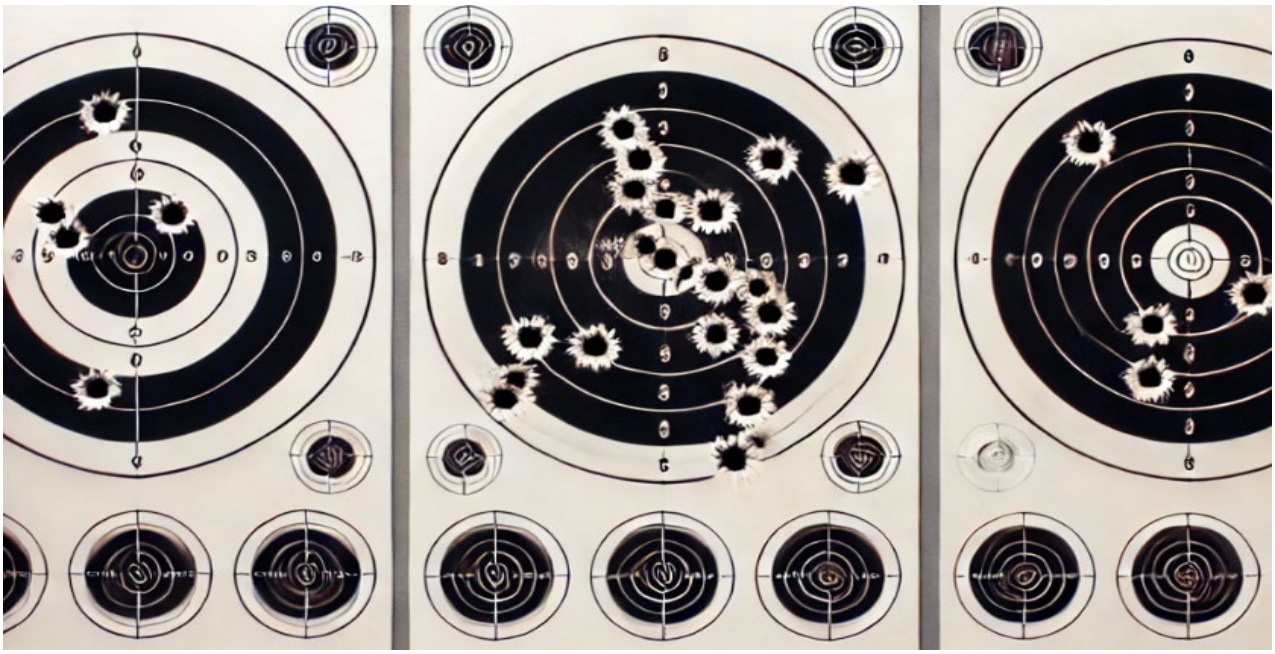
Q1. What is Grouping Capacity? Explain with example.

Q2. What is Snap Shooting? List out the points to be observed while doing continuous snap shooting,

Q3. Explain the tips for firing in Kneeling position.

WEAPON TRAINING (JD/JW)

CHAPTER WT IV : THEORY OF GROUPING & SHOT GROUP ANALYSIS



TEACHING INSTRUCTIONS

Period : Two (02)
Type : Lecture.
Year : 1st Year
Conducting Officer : Permanent Instructor.

Training Aids : Classroom or Squad Post Training, Lesson Plan in File, Board and Markers, WT Gallery.

Time Plan

- Introduction : 05 Min
- Theory of Groups : 20 Min
- Concept of Master Eye : 15 Min
- Sight Alignment and Picture : 15 Min
- Shot Group Analysis & Types of Groups : 10 Min
- Errors During Firing : 10 Min
- Conclusion : 05 Min

INTRODUCTION

1. The Theory of Grouping and Shot Group Analysis is fundamental to understanding the precision and accuracy of firearms. This chapter delves into how shots are clustered (grouped) on a target and what these patterns reveal about a shooter's performance, the rifle's consistency, and external factors affecting accuracy. Grouping refers to the consistency with which multiple shots hit the target in relation to each other, rather than just how close they are to the point of aim. A small shot group indicates high precision, while a wider spread suggests variability in shooting technique or external influences. This chapter also introduces key concepts such as mean point of impact (MPI) and standard deviation, which are used to statistically analyze shot patterns. By understanding grouping and performing shot group analysis, shooters can make informed adjustments to improve their precision and overall shooting performance.

PREVIEW

The lecture will be conducted in the following parts:-

(a) Part I : Theory of Groups.

(b) Part II : Concept of Master Eye.

(c) Part III : Sight Alignment and Sight Picture.

(d) Part IV : Shot Group Analysis and Types of Groups.

(e) Part V : Errors During Firing.

(f) Part VI : Conclusion

LEARNING OBJECTIVES

- Theory of grouping
- Concepts of hat
- Master eye
- Sight alignment & sight picture
- Formation of a group
- Errors during firing

INTERESTING FACTS

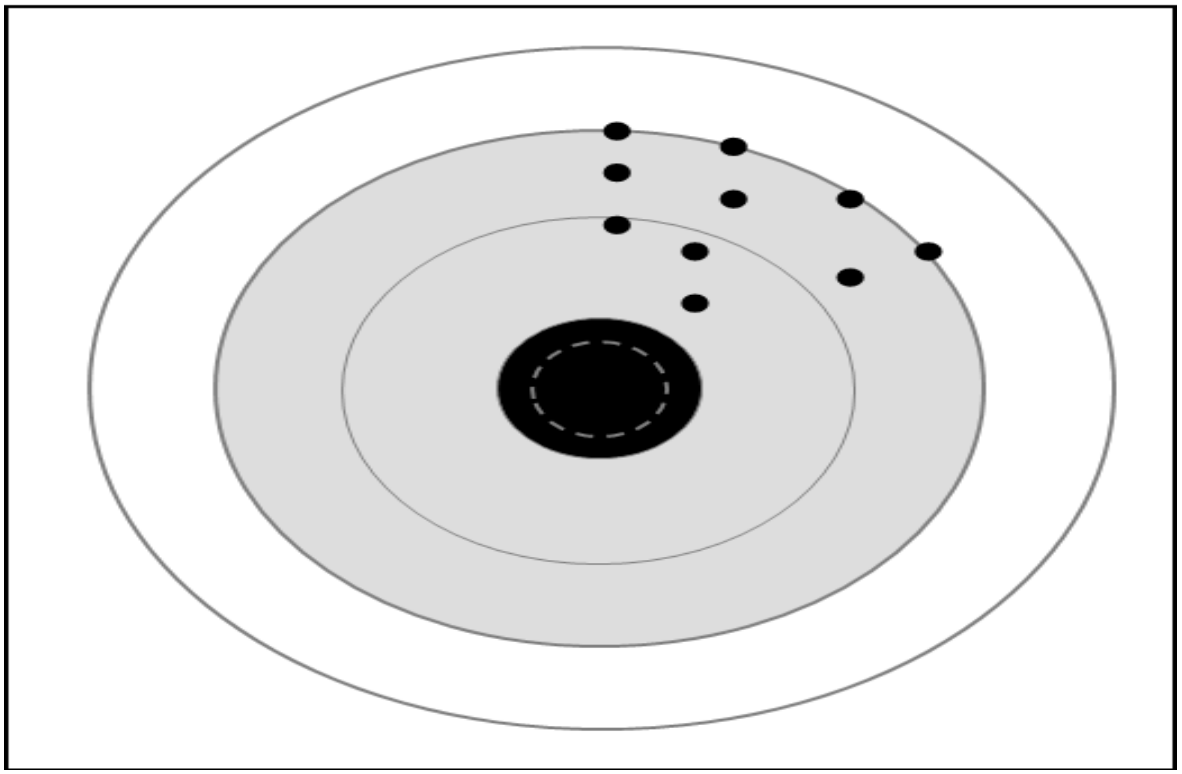
The smallest recorded shot group in history was achieved by legendary shooter Harold R. Vaughan, who achieved a five-shot group that measured only 0.009 inches at a distance of 100 yards! This level of precision is often cited as an example of what is possible with extreme attention to detail in fire arms tuning and environmental control.

In competitive shooting, sub-MOA (Minute of Angle) groups are considered the gold standard of precision. A 1 MOA group means that the shots are within a 1-inch circle at 100 yards. Elite snipers and marksmen strive to shoot even smaller groupings at much greater distances, such as 0.5 MOA or smaller.

PART I : THEORY OF GROUPS

2. **Theory of Groups.** In shooting, the theory of grouping fire is a series of shots fired at the same point of aim which form a group, rather than all hitting the exact same spot.

(a) **Grouping**. The pattern of projectile impacts on a target from multiple shots fired in one session. The width of the grouping is a measure of the weapon's precision and the shooter's skill and consistency.



(b) **Grouping Displacement**. It is the distance between the calculated center of the group and the intended point of aim. This is a measure of accuracy.

(c) **Grouping Capacity**. It is the diameter of a circle that contains all the shots fired by a person to the best of their ability.

(d) **Ammunition**. The weight and charge of the ammunition can affect the size of the group.

(e) **Number of Shots**. A group can be as few as three shots, but five shots is ideal for generating detailed feedback.

3. The size of the group is affected by:-

(a) The ammunition.

(b) The rifle.

(c) The firer.

PART II : CONCEPT OF MASTER EYE

4. **Concept of Master Eye**.

(a) Just as you have a dominant hand, you also have a dominant eye.

(b) You need to aim with the dominant-or master-eye for the most accurate shooting. Usually, your dominant eye is the same as your dominant hand, but not always. You should determine which is your dominant eye before you sight-in your rifle.

(c) To determine your dominant eye:-

(i) Form a triangular opening with your thumbs and forefingers.

(ii) Stretch your arms out in front of you.

(iii) Focus on a distant object while looking through the triangular opening and keeping both eyes open.

(iv) Bring your hands slowly to your face, keeping sight of the object through the opening; the opening will come to your dominant eye naturally.

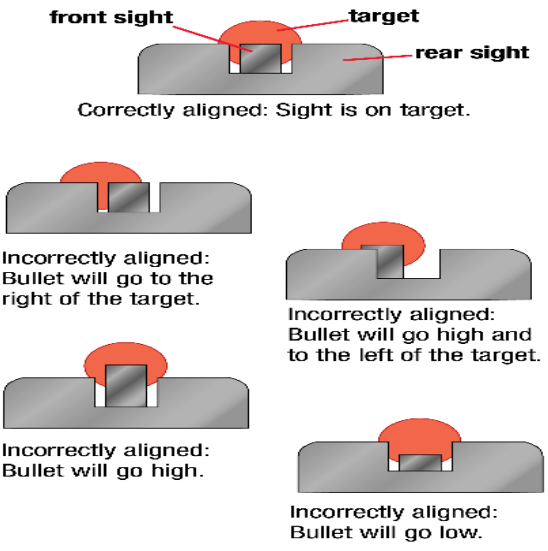
(v) If you're not sure, close one eye at a time. The weak eye will see the back of your hand; the strong one will be focused on the object in the triangle.

PART III : SIGHT ALIGNMENT AND SIGHT PICTURE

5. Sight alignment is the relationship of the front sight to the rear sight. Sight picture is the relationship of your proper sight alignment to your intended target. In other words, are your properly aligned sights aimed at the point on your target you want your bullet to hit?

6. To obtain a proper **sight alignment**, the front sight or post is centered inside the rear sight. The top of the post should be even with the top of the rear sight.

7. A proper Sight Picture is obtained when the aligned sights are put into their proper relationship with the target.



PART IV : SHOT GROUP ANALYSIS

8. **Types of Groups**. A shot group is a pattern of the effects of multiple shots fired in a single session on the target. The width of the group, or how close the shots are together, is a measure of the shooter's skill and weapon accuracy. The distance between point of aim and group calculated center point is called Grouping Displacement, which is a measure of accuracy.

(a) **Compact Group**. A Compact Group is formed when Holding, Aiming and Trigger Operations are followed correctly.

(b) **Scattered Group**. When Point of Aim and Grouping Displacement are away and the width of the group is stretched.

(c) **Bi-focal Group**. This happens when the Firer alternately focuses more on Point of Aim or Foresight Tip.

PART IV : ERRORS DURING FIRING

9. **Errors During Firing**. Not being able to fire at point of Aim on a Firer's target or not making a compact group shows that the firer is making mistakes. Common mistakes are as follows:-

(a) **Bucking**. This is a common shooting mistake that occurs when a shooter tries to control the recoil force before firing. This is done by pushing the shoulder forward, inside the arms.

(b) **Flinching**. The firer anticipates a recoil and unconsciously stresses his muscles. In this case, the firer can bounce or blink as soon as the round is fired.

(c) **Trigger Jerk**. Here the firer pulls the trigger to shoot sharply, which can cause the Sight Picture to be wrong and the shot may miss the target.

10. **Reasons for Washout**. There are two main reasons for washout. Firstly, when the

firer closes his master eye, and secondly when the sight alignment is wrong. It is because of these reasons that the bullet will completely miss the target.

CONCLUSION

11. The Theory of Grouping & Shot Analysis is a fundamental aspect of weapon training that enhances a marksman's understanding of precision and consistency.

12. Grouping refers to the ability to place multiple shots within a compact area on a target, which is critical for assessing shooting skills.

13. The analysis of these shot groups allows shooters to identify patterns, diagnose errors, and make necessary adjustments to improve accuracy.

14. By knowing the errors being made while firing and then improving upon them, less or minimal mistakes are expected during firing competitions.

DID YOU KNOW?

Military snipers often practice extensive shot analysis at various distances to understand how their weapon behaves in different conditions, allowing them to make instant adjustments in the field.

SUMMARY

- **The chapter on Theory of Grouping & Shot Analysis** focuses on the principles and techniques crucial for improving shooting accuracy and consistency. Grouping refers to the ability of a shooter to place several rounds in a tight cluster on a target, demonstrating precision and control. The process of shot analysis involves studying the placement of these shots to identify shooting errors, such as incorrect sight alignment, poor trigger control, or external influences like wind and distance.

- By analyzing shot patterns, shooters can diagnose common issues like flinching, pulling the trigger incorrectly, or adjusting sights inaccurately. This analysis aids in improving one's overall shooting performance by helping to fine-tune skills.

- The chapter also emphasizes the importance of disciplined practice, where regular grouping and shot analysis allow shooters to progressively refine their skills, making adjustments as needed to achieve better accuracy. Ultimately, mastering these techniques is essential not only for individual skill development but also for operational success in military and tactical settings where precision is paramount.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. The pattern of projectile impacts on a target from multiple shots fired.

(a) Ballistics (b) Grouping

(c) Shot Gp (d) MPI

Q2. Relationship of the fore sight to the rear sight.

(a) Sight Picture (b) MPI

(c) Sight Alignment (d) Shot Analysis

Q3. Grouping is tested by firing minimum ___ rounds.

(a) 3 (b) 4

(c) 5 (d) 6

Q4. Distance between pt of aim and group calculated center pt.

(a) Grouping Displacement (b) Gp picture

(c) Gp Alignment (d) Grouping Accuracy

Q5. If precision and accuracy are correct where will the bullet hit?

(a) Top center (b) Centre Left

(c) Bottom Centre (d) Pt of Aim

Q6 The diameter of the circle that contains all the shots fired by a person to the best of their ability.

(a) Grouping Capacity (b) Grouping picture

(c) Grouping Alignment (d) Grouping Accuracy

Q7 The size of the group is affected by_____.

(a) The ammunition (b) The rifle.

(c) The firer. (d) All the above

Q8 Relationship of the fore sight and rear sight to the target.

(a) Sight Picture (b) MPI

(c) Sight Alignment (d) Shot Analysis

Q9. The central point of the group of five bullets.

(a) Compact Group (b) Grouping

(c) Shot Gp (d) MPI

Q10. Weapon is zeroed if ____.

(a) MPI and POA are same (b) MPI and POA are afar

(c) MPI is in centre and POA to right of target

(d) POA is in centre and MPI to right of target

Q11. A firer can form __ types of Groups.

(a) 2 (b) 3

(c) 4 (d) 5

Q12. Group formed by incorrect trigger operation.

(a) Compact (b) Scattered

(c) Bi-Focal (d) None of the above

Q13. When POA and grouping displacement are close ___ Group is formed.

(a) Compact (b) Scattered

(c) Bi-Focal (d) None of the above

Q14. Firing error of pushing shoulder forward is called ____.

(a) Bucking (b) Flinching

(c) Trigger Jerk (d) None of the above

Q15. Firing error of blinking as soon as the round is fired is called ____.

(a) Bucking (b) Flinching

(c) Trigger Jerk (d) None of the above

Short Answer Questions

Q1. What are Grouping and Grouping Displacement?

Q2. What affects the size of a group?

Q3. What is difference between sight alignment and sight picture?

Q4. What is Group and its MPI?

Q5. How do you know that the firer is making mistakes?

Long Answer Questions

Q1. Explain concept of Master Eye. How do you determine it?

Q2. What are the types of Groups? Explain?

Q3. Explain the errors that occur during firing.

WEAPON TRAINING (JD/JW)

CHAPTER WT V : RANGE PROCEDURE , PREPARATION FOR FIRING AND SECURITY OF RANGE

TEACHING INSTRUCTIONS

Period : Two (02)

Type : Lecture.

Year : Each Year- 01 Period

Conducting Officer : Permanent Instructor.

Training Aids : Classroom or Squad Post Training, Lesson Plan in File, Board and Markers, Targets and Target Papers.

Time Plan

• Introduction	:	05 Min	For both the years
• Preparation Before Firing.	:	05 Min	
• Range Procedures	:	10 Min	
• Range Documentation	:	05 Min	
• Alteration of Sight (WT 6)	:	10 Min	
• Conclusion	:	05 Min	

INTRODUCTION

1. To maintain their shooting proficiency, troops practice at range with pistol, carbine and rifle. In our country, short ranges are found in almost every unit but classification ranges are few in numbers. Most NCC Units therefore find it difficult to find appropriate ranges for firing. If one is proficient in the steps required to be taken in order to prepare for firing, lot of time will be saved and max time available can be utilised for the basic firing practise. To take full advantage of the range allotment, preparations before the fire and executing a proper range drill at the range can give practice to all the cadets taking part in firing. Once this is done, firing practice can be carried out with full earnest. Not only can cadets be prepared for competitions but identification of good firers can also be carried out and nurtured thereafter.

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I : Preparation Before Firing.**
- **Part II : Range Procedures & Safety.**
- **Part III : Range Documentation.**
- **Part IV : Alteration of Sight.**
- **Part V : Conclusion.**

LEARNING OBJECTIVES

- **Understanding range procedures**
- **Preparation for firing**
- **Security of range**
- **Essential documentation**
- **Application of fire**
- **Firing practices & competition**

INTERESTING FACTS

- Preparation before firing and executing a proper range drill is as important as firing.
- Application of fire involves using controlled fire in various training scenarios
- Grouping forms the basis of application practices
- Once the grouping capacity of the firer is assessed, it will be his duty not only to maintain this capacity, but to improve on it eradicating any faults he might have

PART I : PREPARATION BEFORE THE FIRING

2. To hone their skills and accomplish proficiency in their profession, troops practice at ranges with various small arms. To take full advantage of the range allotment, preparations before the fire and executing a proper range drill at the range can provide more time to all the trainees to carry out firing practice.

3. At the range, range standing orders should be prepared as per the course and range so that the fire can be started on time and there is no accident during the fire. The following points should be included in the preparation of the range:-

(a) A 20 feet high staff pole on the right edge of the stop butt with a 6 x 6 feet red flag on it.

(b) The soil of the stop butt is soft and that it does not have stones or other hard objects.

(c) Targets should be 20 feet inward from the outer edge.

(d) The stop butt should have a 2x2 feet round target number plate.

(e) A 4x4 feet red flag is placed on a 12 feet pole on the left side of the Markers gallery.

(f) Firing points and trenches should have sand bags filled with soft soil as per format.

(g) The area should be clean.

(h) The following locations must be earmarked and designated on one side of the range:-

(i) For collecting and depositing the Ammunition.

(ii) For the Armorer with his tools and equipment.

(iii) Nursing Assistant.

(j) A telephone line must be laid for the connection along with the radio set.

(k) Sentries, as per standing order, should be in red coat/sleeve.

PART II : RANGE PROCEDURE AND SAFETY PRECAUTIONS

4. **Use of Red Flags**. No firing can take place until all the red flags are hoisted and look-out men posted as per the range standing orders. One flag will always be on the top of the butt. Flags are a warning that the range is in use. A red flag displayed on the butt indicates that no firing should take place.

5. **Suspension of Firing**. If firing is suspended during the practice, owing to some unforeseen event, weapons will be placed on the ground and the firer will stand clear.

6. **Inspection of Weapons**. The officer in charge of the firing point is responsible to ensure that all weapons are cleared and inspected before leaving the firing point.

7. A further inspection will be carried out at the conclusion of firing. During inspection, loading, and unloading, all the rifles must point towards the target. On the command ***Nirikshan ke liye Janch Shastra'*** (Examine Arms) rifles will be held parallel to the ground and pointing in the direction of the target. No one will go to the target area until all weapons have been unloaded, inspected and permission to go has been given by the officer in charge.

8. Only firers, coaches (PI Staff), the firing point officer and his assistants are allowed on the firing point. Waiting details must be at least 10yds from the firing point or in the shelter provided.

9. The following is the normal procedure on the firing points:-

(a) The party to fire is brought within about 100 yds of the firing point.

(b) The practices to be fired are explained.

(c) Firers are allotted targets on which they have to fire.

(d) The PI staff, ammunition party and look out men take up their positions.

(e) The first two details only form up behind their respective targets on the firing point.

(f) On the order of '***Aage Barh***' (Detail Advance) the first detail will take position on the firing point.

(g) On the lowering of the red flag at the butt, the officer supervising the firing point may order his red flag to be taken down and give the order of 'Detail Advance'. The PI staff now checks up their positions and corrects them if needed and gives the word of command 'Limber Up'. On this, the firers must align their rifles to the target. The officer will then give the order to load and Fire.

(h) The firing will start only after getting orders from officer-in-charge firing.

(j) On completion of fire, the firers must raise their right hand up, keeping the elbow on the ground.

(k) Officer-in-charge will give the word of command '***Khali Kar***' (before this he must ensure that all firers have finished firing). On this the firers will take their rifles onto their shoulders and move the bolt twice, press the trigger and stand up.

(l) The officer-in-charge will give the command 'Detail Report'. On this the firers would report '***Number ek rifle theek, do theek, teen theek and number char rifle theek***'. The report will be from left to right (Normally four targets are used on a small range).

(m) The first and last firer will say '***Number ek/char rifle theek'*** and the rest will say '***Do theek, teen theek***' and so on.

(n) The details are changed by word of command and the new detail which has been waiting comes up while another detail forms up behind. (Here the word 'detail' implies to the number of firers who fire at the given targets together at a given time).

(o) Before the firers leave the range, they will have a further weapon inspection. Each firer will be asked whether he/she has any live ammunition. It will be ensured that they have no live ammunition.

(p) **<u>Safety Precautions</u>**.

(i) Treat all rifles as loaded. Always treat a rifle as if it has a bullet in the chamber, even when it is unloaded.

(ii) Always point the rifle in a safe direction, such as down range or towards the ground. The rifle is never pointed towards any individual. This is especially important when loading or unloading the rifle.

(iii) Keep finger off the trigger. The finger should be kept off the trigger until ready to shoot.

(iv) Know your target. Be sure of your target and what is behind, in front of, and around it.

(v) Wear eye and ear protection if warranted.

(vi) Be aware of range status. Check to ensure firearms are unloaded before firing. Stop shooting immediately when "Cease fire" is announced.

(vii) If there is weapon malfunction or accidental discharge, same should be reported immediately.

(viii) In case of medical emergency, the Nursing Assistant must give immediate first aid and if required, the individual should be rushed to the nearest hospital.

PART III : RANGE DOCUMENTATION

10. **Range Documentation**. The following documents are to be maintained at the range during firing practices:-

(a) Firing point register

(b) Butt register

(c) Range course SAO12/S/85 (new RANGE course)

(d) No damage certificate

(e) Ammunition and Fired Case Register

(f) Range Clearance Certificate

(g) Range Allotment Letter with timings clearly specified.

(h) Before and After Firing Inspection Register

(j) Firing Record Register

PART IV : ALTERATION OF SIGHT

11. Alteration of sight implies making adjustments to the back sight of a rifle to bring the

MPI as close to the point of aim. It is necessary because if the elevation of the barrel is not correct during firing, even though the rifle is fired using correct aim, the shots will hit either high or low instead of hitting at the point of aim. Thus it would be necessary (time allowing), to readjust the setting of back sight.

12. The amount of alteration necessary depends upon the distance of the hit from the point of aim. The round may hit either right/left or high/low from the intended point of aim. Based on this, the back/fore sight is adjusted by the armourer. The cadets need to understand that if alteration is necessary, they should inform the instructors present . The same will be informed to the Armourer present at the range, who will then adjust the sight accordingly.

13. For information of cadets, if round is hitting left of point of aim, then the left screw on back sight is tightened and right screw is loosened. It is done the opposite way if round is hitting to the right. If round is hitting above point of aim, then the fore sight is raised. If round is hitting below the point of aim, then the fore sight is lowered.

CONCLUSION

14. Following range procedures and security protocol is essential for maintaining a safe environment during firearm training.

15. Strict adherence to the established rules not only ensures the safety of the firers and range staff but also contributes to the effectiveness of the training.

16. Proper communication, proper documentation, clear signage, and the vigilance of range officers are key factors in preventing accidents.

17. The security of the range-both in terms of physical safety and the secure handling of weapons and ammunition-is paramount.

18. By adhering to these guidelines, shooters can focus on their training while minimizing risks, creating a controlled and efficient learning environment.

SUMMARY

- The chapter outlines the critical protocols and safety measures necessary for ensuring safe and efficient operations during firearm training exercises on a firing range. It briefly covers standard operating procedures (SOPs) that govern the setup, conduct, and closure of a range. This includes ensuring the correct positioning of targets, establishing firing lanes, and maintaining clear communication between range officers and firers.

- A major focus is placed on safety measures, such as handling firearms responsibly, the importance of wearing protective gear (like helmet, ear and eye protection), and the significance of following all instructions from range officers. The chapter also delves into documentation incl security protocols, which aim to prevent unauthorized access to the range, ensure that weapons and ammunition are accounted for, and that no live rounds are left uncollected after a session.

- Additionally, it covers emergency procedures for incidents like firearm malfunctions, accidental discharges or medical emergencies, highlighting the need for range personnel to be trained in first aid and crisis management.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Firing is done from____.

(a) Waiting Area (b) Firing Point

(c) Stop Butt (d) None of the Above

Q2. During 'Bhar' command, which action will be done at firing range.

(a) Filling bullets into the magazine (b) Filling bullets into the chamber

(c) Fitting magazine into the Rifle (d) Trigger press

Q3. Limber up means ____.

(a) Firers must align rifles (b) Firers must start firing

(c) Firers must Stop firing (d) Firers must Check target

Q4. On orders of Fire ___ action is taken:-

(a) Firer moves towards firing butt (b) Cocking the Rifle

(c) Fitting magazine in rifle (d) Starts firing

Q5. In 'Khali kar' orders, rifle will be cocked.

(a) 1 time (b) 2 times

(c) 3 times (d) 4 times

Q6. Red colored flag at Stop Butt means___.

(a) Start Firing (b) Stop Firing

(c) Only Grouping to be carried out (d) None of the Above

Q7. Soil on the Butt should be ____.

(a) Hard (b) Soft

(c) Mixed with stone (d) None of the above

Q8. On order of '*Aage Barh*'

(a) Start the fire (b) Details advance

(c) Stop fire (d) Check target

Q9. On orders of "cease fire"___

(a) Firing to start (b) Firing to restart

(c) All firing to Stop (d) None of the Above

Q10. _____rounds are minimum fired to create a grouping.

(a) 3 (b) 4

(c) 5 (d) 6

Q11. The center point of a Group formed is called___.

(a) Group (b) Grouping Capacity

(c) MPI (d) None of the above

Q12. Application fire is focused upon ____.

(a) Skill development (b) Safety

(c) Tactical effectiveness (d) All the above

Q13. Declaration is done when _____.

(a) When aim is not correct (b) When aim is correct

(c) All the above (d) None of the above

Q14. Firer should do firing in following order:-

(a) Grouping-Application-Snap Shot

(b) Snap Shot-Grouping-Application

(c) Grouping-Snap Shot- Application

(d) Application-Snap Shot-Grouping

Q15. Snap shot helps in defeating the ____.

(a) Time Factor

(b) Handling errors

(c) Weapon malfunction

(d) None of the above

Short Answer Questions

Q1. Why is preparation before firing important?

Q2. Give three pts of preparation of a range.

Q3. What are the various stands placed in a range during firing?

Q4. Why is it important to fix the range correctly while firing?

Q5. What is the necessity of alteration of sight?

Long Answer Questions

Q1. What is the procedure followed for firing at a range?

Q2. List out the various range documents.

Q3. What are the safety precautions to be taken before firing?

Note : Question Numbers 10 to 15 (Multiple Choice) and Question Number 5 (Short Answers) refer to Chapter WT 6.

WEAPON TRAINING (JD/JW)

CHAPTER WT VI : SHORT RANGE FIRING

"Taking my shot, one round at a time. Shooting for the stars, hitting every target. Stepping up my shooting game, one bullet at a time. When it comes to shooting, I'm a sharpshooter."

TEACHING INSTRUCTIONS

Period : 01 x Theory, 10 x Practical Firing (Total 11)

Type : Theory and Practical

Year : 1st Year - 04 (1xTheory + 4 x Firing Practical)

: 2nd Year - 07 (1xTheory + 6 x Firing Practical)

Conducting Officer : Permanent Instructor.

Training Aids : Short Range, Targets, Weapons, Ammunition.

Time Plan : 0800 to 1600 hr

INTRODUCTION

1. Having undergone training of handling weapons, it's charecteristics, maintining it and the procedure and precautions to be adhered to at the ranges, the Cadets now need to undergo actual firing practice. One need to ensure that firing should be done in a phased manner so that the cadets, who are carrying out live firing for the first time, get to experience the joy of competitive firing. If trained properly, the talented kids can be identified so that better training can be provided to them.

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I : Grouping Fire.**
- **Part II : Application Fire.**
- **Part III : Snap Shot.**
- **Part IV : Conclusion.**

LEARNING OBJECTIVES

- **Practicing the range procedures**
- **Preparation for firing**
- **Ensure range security**
- **Firing practices & competition**

INTERESTING FACTS

- Preparation before firing and executing a proper range drill is as important as firing.
- Application of fire involves using controlled fire in various training scenarios.
- Grouping forms the basis of application practice.
- Once the grouping capacity of the firer is assessed, it will be his duty not only to maintain this capacity, but to improve on it eradicating any faults he might have had in early shoots.

PART I : GROUPING FIRE

2. The Grouping fire will be fired as follows:-

(a)	Distance	:	25 Mtrs
(b)	Number of rounds	:	Five.
(c)	Position	:	Lying with rest.
(d)	Target	:	1' x 1' Grouping Target.

(e) Highest Points : 40

(f) Time : Own Time

(g) **Scoring**

(i) 2.0 cms & below : 40 Points

(ii) 2.5 cms & below : 36 Points

(iii) 3.0 cms & below : 32 Points

(iv) 3.5 cms & below : 28 Points

(v) 4.0 cms & below : 24 Points

(vi) 4.5 cms & below : 20 Points

(vii) 5.0 cms & below : 16 Points

(viii) 5.5 cms & below : 12 Points

(ix) 6.0 cms & below : 08 Points

(x) 6.5 cms & below : 04 Points

(xi) Above 6.5 cms : 00 Points

PART II : APPLICATION FIRE

3. The Application fire will be fired as follows:-

(a) Distance : 25 Mtrs

(b) Number of rounds : Five.

(c) Position : Lying without rest.

(d) Target : 1' x 1' Application Target.

(e) Highest points : 40

(f) Time : Own time

(g) **Scoring**

(i) Bull : 8 Points

(ii) Inner : 6 Points

(iii) Magpie : 4 Points

(iv) Outer : 2 Points

(h) Similar practice will be carried out from Kneeling and standing (both supported and unsupported) position.

PART III : SNAP SHOOTING

4. The Snap Shot fire will be fired as follows:-

(a) Distance : 25 Meters

(b) Number of rounds : Five

(c) Position : Lying without rest

(d) Target : Figure 11 miniature

(e) Highest points : 50

(f) Time : Five exposures of seven seconds each

CONCLUSION

5. Shooting practice is important not only for sports shooting but also for self defence development.

6. In order to develop these aspirations in NCC Cdts, it is necessary that firing practice at short ranges be undertaken with utmost sincerity.

7. The short time available as also the dearth of ranges implies that we should utilize these instances to the fullest.

8. Apart from giving all the cadets an experience at firing, identification and nurturing of talent is of utmost importance.

SUMMARY

- The chapter outlines the types of practices the cadets need to undergo during firing at a range.
- Since identification of good firer is important, focus to be on grouping initially and application and snap shot subsequently.
- Additionally, the cadet gets to know the range procedures and firing precautions to be taken.

STANDARD OBSTACLE TRAINING

3

CHAPTER WISE INDEX : OBSTACLE TRAINING (OT)

OBSTACLE TRAINING (OT)

CHAPTER OT I : STANDARD OBSTACLE TRAINING

" Don't let the obstacles in your path be the reason you give up. Let them be the reason you push harder."

- Unknown

TEACHING INSTRUCTIONS

Type	:	Lecture and Practice
Year	:	1st & 2nd Year JD/JW
Conducting Officer	:	Permanent Instructor and ANO
Training Aids	:	Class room, OHP, Board, Chalk/Markers & OT Area

JD/JW

Distribution of Periods :

1st Year : Number of Period(s) - 1
2nd Year : Number of Period(s) - 1

1st & 2nd Year : 1 period each familiarisation & introduction to obstacle training. Detailed description of each of the ten obstacles

INTRODUCTION

1. The National Cadet Corps (NCC) stands as one of India's foremost youth organizations, dedicated to instilling character, leadership, and discipline in its cadets. Central to its comprehensive training regimen is the focus on both physical fitness and mental resilience, essential qualities for shaping the leaders of tomorrow. Among its diverse training modules, obstacle course training holds particular significance, as it sharpens not only the cadets' physical strength but also their problem-solving abilities, teamwork, and leadership skills. This training builds confidence, cultivates courage, and strengthens willpower, empowering cadets to overcome any challenge or barrier in life. It equips them to tackle both physical and mental obstacles, fostering resilience that will benefit them in all facets of their personal and professional journeys.

PART I : OBSTACLE COURSE AND METHODS OF NEGOTIATION

2. Obstacle training in the NCC is a rigorous and dynamic activity that blends physical exertion with mental resilience. Cadets must navigate a series of ten obstacles, each designed to teach proper techniques in jumping, balancing, scaling, and vaulting. This training plays a crucial role in fostering early fitness development among cadets. Every obstacle targets specific attributes such as strength, endurance, agility, coordination, and balance. The sequence of obstacles challenges cadets to think quickly, manage their energy efficiently, and maintain focus under pressure. The demanding nature of the course pushes cadets beyond their comfort zones, helping them uncover their true potential.

The Standard Obstacle Course that NCC cadets must navigate comprises ten distinct obstacles, each spaced about 30 feet (10 yards) apart. Constructed from materials such as wood, bricks, concrete, and mud, these obstacles challenge cadets both physically and mentally. The course begins at the start line, and the cadets proceed to tackle obstacles in the following order: straight balance, clear jump, gate vault, zig-zag balance, high wall, double ditch, right vault, left vault, ramp, another straight balance, before finally crossing the finish line.

3. **Straight Balance**

(a) **Description**. The obstacle consists of a wooden slab measuring 3 inches thick, 4 inches wide, and 12 feet long, positioned 1.5 feet above ground level.

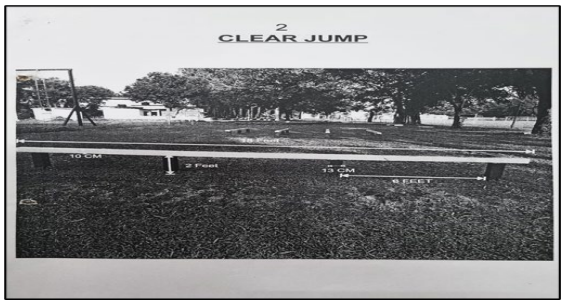
(b) **Method**. The cadet crosses the slab by running with arms outstretched to maintain balance. This obstacle emphasizes body balance and coordination.

Relaxation is key to successfully navigating obstacles where balance is crucial. A relaxed approach builds confidence and enables faster crossings, while tension often results in loss of balance or, at best, slower progress. The position of the head plays a vital role in maintaining balance and should be kept as upright as possible, especially when moving on narrow surfaces or at heights. The eyes should neither point directly downward which may cause instability and impose more caution, nor look straight ahead which can lead to missteps or chances of fall. Ideally, the focus should be about 3 meters ahead. Since rifles are carried during obstacle courses, it is important to learn crossing the obstacle without raising of arms sideways for balance.

4. **Clear Jump**

(a) **Description**. Its structure resembles a straight wooden bar, 18 feet long and positioned 2 feet above the ground. The cadet must jump over the bar without touching it or using any part of the body for support.

(b) **Method**. After a short run toward the obstacle at a right angle, the cadet takes off from one foot. Both knees are then quickly raised high in front of the chest to ensure the feet clear the bar. To aid in lifting the body, the arms, slightly bent, swing forward as the knees rise. Once the obstacle is cleared, the knees and body extend, and the arms lower. The landing is executed by stepping off with one foot while moving the other just past the edge of the bar, jumping downward and slightly forward. Controlling body balance during both the flight and landing is key. The landing should be with feet and knees together, pointed forward, and with enough knee bend to absorb the impact, preventing jarring to the body



5. **Gate Vault**.

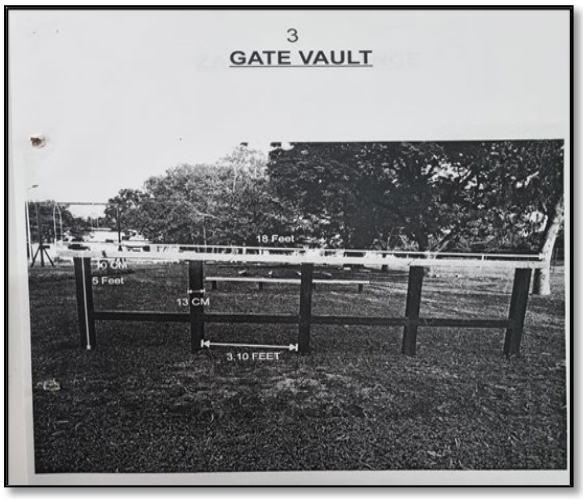
(a) **Description**. This obstacle consists of a wooden structure with two horizontal beams, positioned at heights of 3 feet and 5 feet, each 18 feet long.

(b) **Method**. To cross this gate, you must grip the upper beam with both hands, place your feet on the lower beam, and then jump across. This vaulting technique is particularly useful for overcoming gates. Begin with a short run-up, then take off from one leg, aiming to grip the top beam with both hands while jumping for the lower beam. Once you achieve balance, lean your torso forward and downward, moving one hand across to the opposite side of the structure until it aligns with the other hand. At this point, grasp the lower beam and roll your body over it. Common Faults in crossing gate vault is when cadet jumps instead of step up. Stepping up to the lower beam rather than jumping for it can result in a loss of speed and an uncontrolled landing.

(c) **Common Faults.**

(i) Stepping up instead of jumping up to the lower beam, which can result in loss of speed and lead to uncontrolled landing.

(ii) Keeping upper body balance back, which can lead to backward fall



6. **Zig-Zag Balance**.

(a) **Description**. An 18-foot-long wooden beam, constructed in a zig-zag manner, 3 inches wide and 1½ feet above the ground.

(b) **Method**. The cadet crosses the beam while balancing the body in a zig-zag motion, with arms open for support.

(i) **Approach the Obstacle**. Begin with a steady, controlled pace as you approach the zig-zag balance beam. Maintain a relaxed posture and focus on balance.

(ii) **Initial Step**. Step onto the beam confidently with your dominant foot. Keep your arms outstretched to the sides for balance.

(iii) **Foot Placement**. Place your feet carefully, one in front of the other, ensuring each step is centered on the beam. Avoid long strides, as shorter, more controlled steps offer better balance.

(iv) **Zig-Zag Transition**. As you reach each turn in the beam, pivot smoothly on the heels of your feet. Maintain control and avoid rushing through the turns, as this is where balance is most easily lost.

(v) **Maintain Focus**. Keep your head upright and focus your eyes a few feet ahead of each step, rather than looking directly down at the beam. This helps with overall balance and coordination.

(vi) **Arm Control**. Keep your arms slightly raised and extended for stability but avoid exaggerated movements. Subtle adjustments help maintain balance throughout the course.

(vii) **Finish Strong**. As you approach the end of the zig-zag beam, maintain your focus and continue with the same controlled steps. Step off the beam confidently once you reach the finish.

7. **High Wall**

(a) **Description**. The obstacle consists of a 6-foot-high, 12-foot-long bricked wall, plastered on both sides.

(b) **Method**. All cadets should try and cross this obstacle individually. For team exercises and for cadets who aren't able to cross it on its own, the "stirrup lift" team approach may be used.

In the **individual method**, the cadet runs towards the wall and leaps, kicking off the wall with one leg. Using both hands to grip the top, the cadet pushes upward, pulling their body onto the wall. Once gripping the top with both hands, the cadet bends their arms, first placing one forearm and then the opposite palm on the wall to gain leverage. This allows the cadet to roll over the top safely, rather than standing or sitting on it, minimizing exposure as also wasting time. In the **stirrup lift method**, used when teamwork is involved, two cadets stand against the wall facing each other. They form a "stirrup" by placing their hands on one cadet's bent leg, creating a platform for the climber. The climber steps into the stirrup and reaches for the top of the wall. As the lifters push up under his heels, the climber is propelled high enough to grasp the top and roll over. Like in the individual method, cadets should avoid sitting on the wall to prevent making themselves visible. Cadets are also trained in the correct descent method. After rolling over, they should hang down from the wall with fully extended arms, releasing one hand for balance. A strong push-off from the remaining hand should be made, turning their body so they land with their back to the wall, ensuring a safer landing

(c) **Common Faults**.

(i) Approaching the wall with speed and abruptly stopping owing to miscalculation resulting in injury.

(ii) Standing or taking a high position on the wall instead of rolling over

8. **Double Ditch**.

(a) **Description**. The obstacle consists of two ditches, each measuring 6-8 feet in length, 4-5 feet in width, and 3-4 feet in depth, with a small gap of 9-12 inches between them.

(b) **Method**. Begin with a preliminary run-up and take off from one foot. As you leap across the first ditch, place one foot on the small gap before jumping over the second ditch and landing across on the other foot. This maneuver requires precise agility and timing.

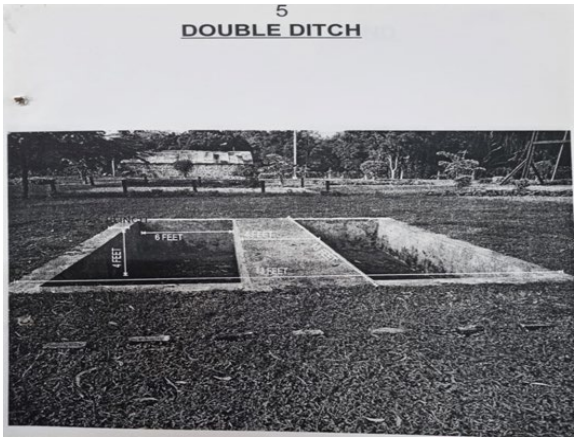
(c) **Common Faults**.

(i) **Insufficient Speed**. A lack of speed during the run-up can hinder performance.

(ii) **Uncontrolled Flight**. Poor control during flight can affect your ability to clear the ditches.

(iii) **Lack of Height**. Inadequate height can lead to difficulties in clearing the obstacles.

(iv) **Uncontrolled Landing**. Landing on both feet instead of one, either in between the ditches or after the second one, will lead to body falling forward because of speed of motion. Ensure stable take off and landing on one foot



9. **Right Hand Vault.**

(a) **Description**. This wooden structure stands 3.5 feet above the ground and is 18 feet long. The cadet must jump over it by using the right hand for support while lifting both legs over the beam.

(b) **Method**. As far as possible, approach the obstacle straight, not from the side, and take off on one foot to cross the obstacle, while placing the right hand on top of the beam for support. The body's weight is shifted entirely onto the right arm as the cadet moves over the obstacle with the right side facing it. The landing be made on one foot to maintain momentum. Only right hand should touch the beam, violation of which incurs a penalty in competitions including TSC.

10. **Left Hand Vault**.

(a) **Description**. This wooden structure, similar to the Right Hand Vault, stands 3.5 feet above the ground and is 18.5 feet long.

(b) **Method**. As far as possible, approach the obstacle straight, not from the side, and take off on one foot to cross the obstacle, while placing the right hand on top of the beam for support. The body weight is shifted entirely onto the right arm as the cadet moves over the obstacle with the right side facing it. The landing be made on one foot to maintain momentum. Only left hand should touch the beam, violation of which incurs a penalty in competitions including TSC.

(c) **Common Faults.** Not maintaining enough momentum or stopping abruptly before crossing the obstacle, leading to injury.

HIGHER ORDER THINKING SKILLS (HOTS)

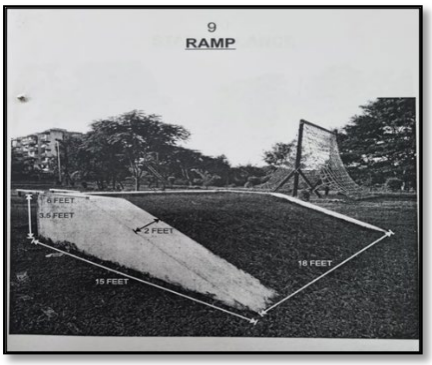
- What is the aim of obstacle course training and how many obstacles are included in the Standard Obstacle Training?
- How does the obstacle course training contribute to the development of NCC cadets?

11. **Ramp**.

(a) **Description**. The obstacle is a sloped hillock, measuring 15 feet in length, 18 feet in width, and 4.5 feet in height.

(b) **Method**. To cross it, the cadet runs up the slope to the top and takes a long jump, landing in the designated area, preferably on both feet. The knees have to be slightly bent to absorb the landing shock. The run-up should be steady and controlled, ensuring a smooth jump from the top and a balanced landing.

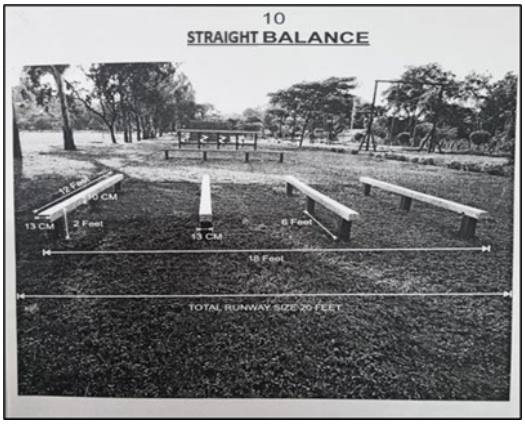
(c) **Common Faults** Most injuries in this obstacle occur while landing. Major reason for the same is unsteady landing, especially on one foot, or landing without bending the knees even on both feet. Over weight participants are more at risk.



12. **Straight Balance**.

(a) **Description**: Similar to the first Straight Balance obstacle.

(b) **Method**: To approached as explained in first obstacle



PART II : DRESS & EQUIPMENT

1. **Dress**. The training attire should progress through different stages. Initially, obstacle-negotiating techniques should be taught in tracksuits or **Single belt** for the first two sessions. Belt is advised to be worn even over tracksuits to maintain taut posture. **Even when wearing tracksuits, only DMS boots will be worn. The obstacle course should not be done in PT shoes, sports shoes or Jungle boots, which may lead to severe injury**. By the third session, cadets should wear disruptive shirts, trousers, and boots. In the final stage of instruction, typically during the Standard Obstacle Course, the attire will be Battle Order less rifle

2. **Obstacles for Senior Wing (SW) Cadets**. Senior Wing girl cadets are required to navigate the following obstacles:-

(a) Straight Balance.

(b) Clear Jump.

(c) Gate Vault.

(d) Zig-Zag Balance.

(e) Ramp.

(f) Straight Balance (Repeated).

PART III : METHODOLOGY OF NEGOTIATING THE OBSTACLE COURSE

1. **Practice in Negotiating the Obstacle Course**. Regular practice is essential for mastering the skills needed to effectively navigate an obstacle course. Repeated exposure helps cadets build confidence, physical strength, agility, and mental resilience, all of which are key to overcoming various obstacles. During practice sessions, cadets should focus on improving their technique for each individual obstacle, such as jumps, vaults, balance beams, and climbing structures. Key aspects of successful obstacle course practice include:-

(a) **Progressive Training**. Start with basic techniques, gradually moving to more complex challenges as cadets build strength and skill.

(b) **Repetition for Muscle Memory**. Repeating each obstacle helps engrain proper technique, ensuring that movements become automatic and fluid during real-time challenges.

(c) **Attention to Form**. Emphasis should be placed on proper posture, balance, and footwork to prevent injury and maximize efficiency.

(d) **Developing Speed and Endurance**. As cadets gain proficiency, they should work on increasing their speed while maintaining control and precision. Endurance training is equally important for managing fatigue.

(e) **Mental Preparation**. Tackling obstacles often requires quick decision-making and adaptability, so practice sessions should also focus on building mental toughness and focus. With consistent practice, cadets improve both their physical capabilities and the confidence needed to negotiate the obstacle course effectively.

2. **Safety Measures for Successful and Safe Completion of the Obstacle Course**.

(a) **Participant Selection**. Only physically fit cadets should engage in obstacle course training.

(b) **Progressive Training**. Begin training in single belt, gradually progressing to more advanced stages with packs and weapons.

(c) **Warm up**. Proper warming up as per weather conditions is a must to practice safely and avoid injuries. Participants should only be allowed to enter the obstacle arena after having warmed up, which will include both running and stretching.

(d) **Avoid Hazardous Conditions.** Steer clear of wet or slippery surfaces to minimize the risk of injury. Contact surface of the obstacles must be cleaned with dry cloth if it is suspected to be wet. Check the serviceability of the obstacles to ensure they do not give way in between practice.

(e) **Qualified Supervision**. Obstacles should be attempted under the guidance of trained instructors to ensure proper technique and safety.

(f) **First Aid Preparedness**. Ensure that first aid facilities are readily available for any injuries that may occur.

3. **Benefits of Obstacle Course Training**.

(a) **Physical Fitness**. Improves overall strength, endurance, and cardiovascular health, making cadets physically robust.

(b) **Agility**. Sharpens the ability to move swiftly and fluidly, essential in navigating dynamic environments.

(c) **Mental Toughness**. Builds resilience and grit by pushing cadets to overcome difficult challenges.

(d) **Coordination and Balance**. Enhances coordination between the mind and body, resulting in better balance and precision in movement.

(e) **Risk-Taking Ability**. Encourages cadets to assess risks and face their fears, fostering confidence in decision-making.

(f) **Problem-Solving Skills**. Teaches cadets to quickly analyze situations and make effective decisions under pressure.

(g) **Team Spirit**. Strengthens collaboration and communication skills, fostering teamwork and unity among cadets.

(h) **Developing Physical and Mental Fitness**. Builds both physical and mental endurance, essential for overcoming obstacles and challenges.

(j) **Enhancing Leadership and Teamwork**. Instils leadership qualities and the importance of working as a cohesive team.

(k) **Building Confidence and Self-Esteem**. Boosts self-confidence by successfully overcoming physical and mental challenges.

(l) **Preparing for Real-Life Challenges**. Equips cadets with the skills to handle both physical and psychological challenges in life.

(m) **Cultivating Discipline and Resilience**. Promotes discipline and resilience, essential qualities for personal and professional growth.

(n) **Promoting Tactical Thinking**. Encourages strategic thinking and the ability to quickly devise solutions in complex situations.

4. **Demonstration**. Demonstrations will be conducted by trained cadets under the supervision of PI Staff. This live demonstration allows cadets to observe proper technique and safety practices before attempting the course themselves.

CONCLUSION

5. Obstacle course training is a cornerstone of NCC's comprehensive physical fitness regimen. By teaching cadets how to navigate physical challenges, the training develops not just physical fitness but also critical mental and emotional traits like patience, courage, and determination. Intensive obstacle training, particularly during camps like the Thal Sainik Camp, builds the foundation for a well-rounded and confident individual, capable of tackling any challenge with poise and skill. The obstacle course training is more than a physical exercise; it is a test of mental robustness, teamwork, and personal courage.

SUMMARY

- Obstacle training is a vital component of the NCC curriculum, designed to enhance cadets' physical fitness, mental resilience, and leadership skills. The training involves navigating a series of ten obstacles, such as the Straight Balance, High Wall, Double Ditch, and Zig-Zag Balance, each testing balance, agility, strength, and coordination.

- The primary objectives include building confidence, patience, and courage while improving agility, problem-solving abilities, and teamwork. Safety is a key focus, with cadets trained under supervision and proper techniques emphasized. The training fosters physical endurance, mental robustness, and a spirit of camaraderie.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. The Standard Obstacle Course that the NCC SW are required to cross consists of _____ obstacles?

(a) 6 (b) 8

(c) 10 (d) 12

Q2. Clear Jump has a bar that is placed _____above the ground?

(a) 1 ft (b) 2 ft

(c) 4 ft (d) 1.5 Ft

Q3. The Standard height of High Wall obstacles is ?

(a) 10ft (b) 8 ft

(c) 6 ft (d) 12 ft

Q4. Which of the following obstacle is optional for Girl cadet?

(a) Straight Balance (b) Clear Jump

(c) Zig Zag (d) High wall

Q5. What is the purpose of obstacle course training for NCC cadets?

(a) To enhance academic skills

(b) To develop musical talents

(c) To improve physical strength, confidence, courage, and willpower

(d) To practice marksmanship

Q6. How is the "Clear Jump" obstacle in the Standard Obstacle Course described?

(a) Jumping over a wooden slab with open arms

(b) Crossing a gate with parallel bars

(c) Running over a Zig-Zag structure with open hands

(d) Jumping over a straight bar without body contact

Q7. Which obstacle involves jumping over a bricked wall with plaster on both sides?

(a) Straight Balance (b) High Wall
(c) Double Ditch (d) Ramp

Q8. What safety measure is emphasized during the Obstacle Course training?

(a) Selecting cadets randomly
(b) Conducting training without any supervision
(c) Avoiding wet and slippery obstacles
(d) Ignoring the correct technique

Q9. What benefit does obstacle course training provide according to the lesson?

(a) Musical skills improvement (b) Flexibility and mental strength
(c) Enhancing academic performance (d) Learning marksmanship

Q10. In the "Left Hand Vault" obstacle, how does the cadet overcome it?

(a) Jumping over using the right hand (b) Jumping over using both hands
(c) Jumping over using the left hand (d) Crawling and climbing

Q11. Where does intensive training for NCC cadets take place, especially in Thal Sainik Camps?

(a) Obstacle Course centers (b) Regular classrooms
(c) Music training camps (d) PT dress training camps

Q12. According to the text, what qualities does obstacle course training aim to increase in NCC cadets?

(a) Laziness and indifference (b) Agility, courage, patience, and confidence
(c) Lack of teamwork (d) Fear and self-doubt

Q13. What is the primary focus during the conduct of Obstacle Course training, according to safety measures?

(a) Ignoring individual and team timings
(b) Emphasizing individual timings only
(c) Emphasizing team timings only
(d) Ensuring suitable and physically fit cadets are selected

Q14. How many obstacles does the Standard Obstacle Course consist of?

(a) Five (b) Ten

(c) Fifteen (d) Twenty

Q15. What is the structure of the "Clear Jump" obstacle?

(a) Zig-Zag like wooden bar (b) 6 feet high bricked wall

(c) 18 ft long straight bar (d) Wooden slab above ground level

Q16. How is the "High Wall" obstacle crossed?

(a) Running and jumping over it (b) Crawling under it

(c) Kicking the wall with both legs (d) Climbing over with hands and feet

Q17. Which safety measure is emphasized during the conduct of Obstacle Course training?

(a) Wet and slippery obstacles are encouraged

(b) Training without supervision

(c) Suitable and physically fit cadets only to be selected

(d) Obstacles done without correct techniques

Q18. What benefit does obstacle course training NOT provide?

(a) Mental strength (b) Physical fitness

(c) Artistic skills (d) Risk-taking ability

Q19. Where is intensive training given to NCC cadets, especially in Thal Sainik Camps?

(a) In regular classrooms (b) During outdoor sports events

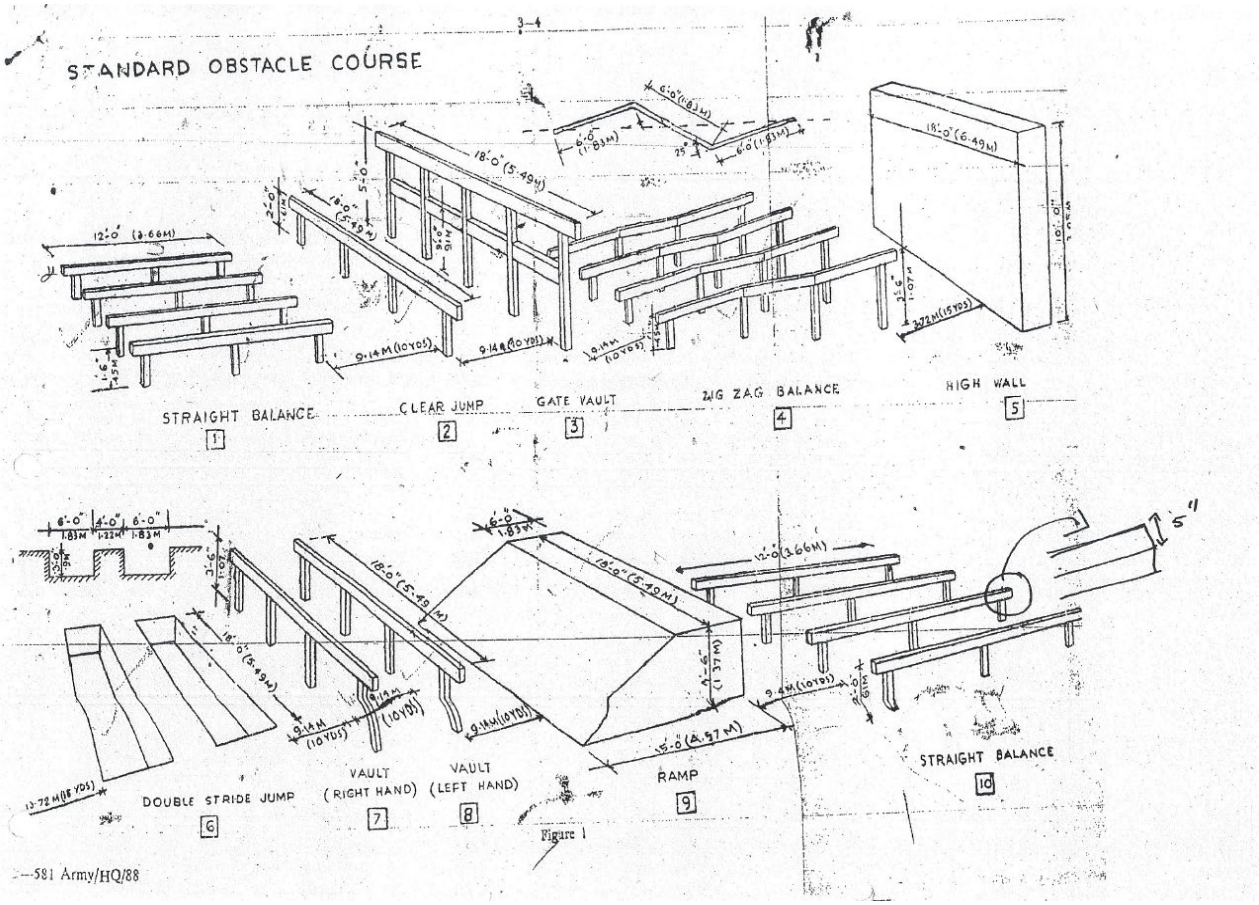
(c) In the obstacle course training area (d) In the camps, especially in Thal Sainik Camps

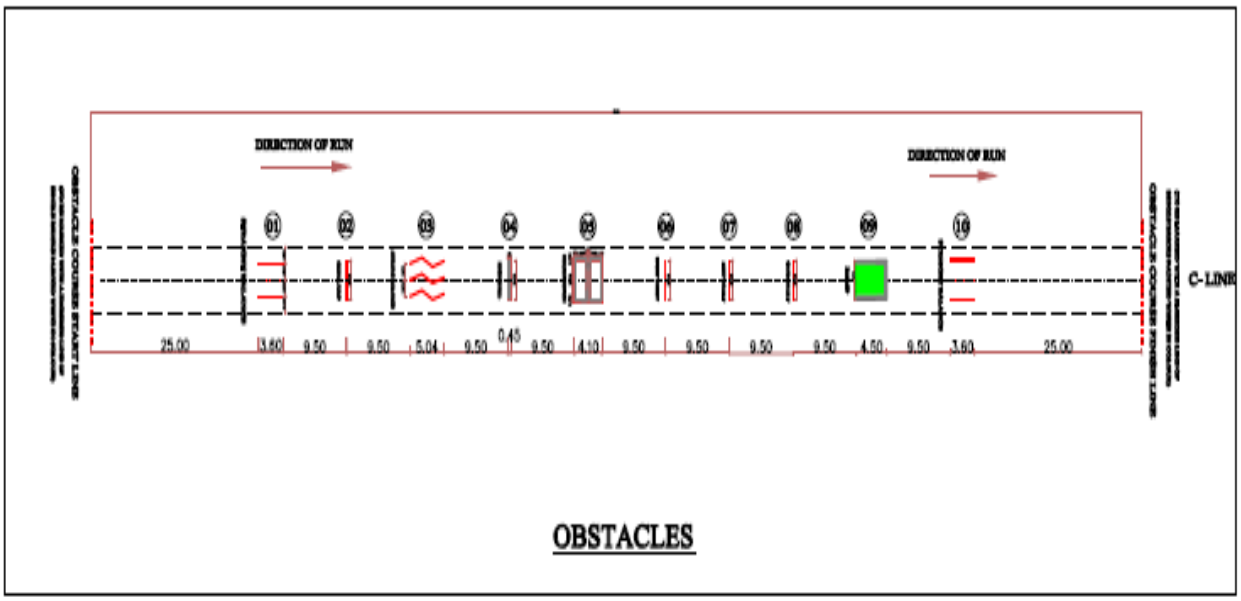
Q20. What is one of the benefits of completing the Obstacle Course training?

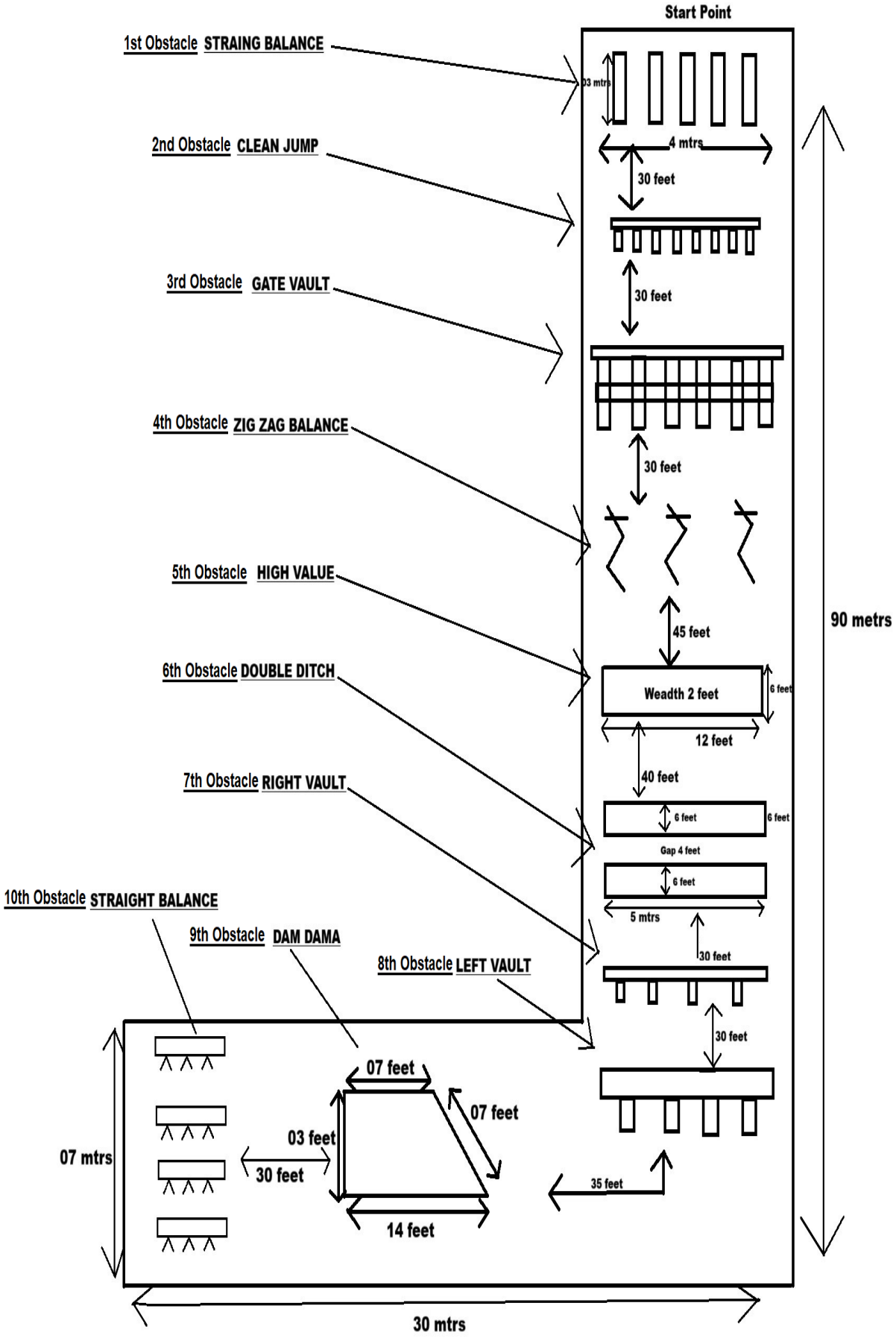
(a) Enhancing artistic skills (b) Improving risk-taking ability

(c) Developing culinary expertise (d) Mastering computer programming

SCHEMATIC LAYOUT OF STD OBST COURSE
(Basic and Battle Physical Training Pamphlet No 5 Obstacle Training - 1970)






Start Point
1st Obstacle STRAING BALANCE
03 mtrs
2nd Obstacle CLEAN JUMP
4 mtrs
30 feet
3rd Obstacle GATE VAULT
30 feet
4th Obstacle ZIG ZAG BALANCE
30 feet
5th Obstacle HIGH VALUE
45 feet
90 metrs
6th Obstacle DOUBLE DITCH
Weadth 2 feet
6 feet
12 feet
7th Obstacle RIGHT VAULT
40 feet
6 feet
6 feet
Gap 4 feet
6 feet
5 mtrs
10th Obstacle STRAIGHT BALANCE
9th Obstacle DAM DAMA
8th Obstacle LEFT VAULT
30 feet
30 feet
07 feet
07 feet
03 feet
30 feet
07 mtrs
35 feet
14 feet
30 mtrs

DRONES

4

CHAPTER WISE INDEX: DRONES (D)

DRONES

CHAPTER D I: EVOLUTION AND TYPES OF DRONES

"A drone, in technological terms, is an unmanned aircraft. … Essentially, a drone is a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS"

TEACHING INSTRUCTIONS

Period	:	One (01)
Type	:	Lecture and Presentation
Year	:	1st Year JD/JW
Conducting Officer	:	Officer/ Trained PI/ AMI/CGI
Training Aids	:	Class Room, Computer with OHP, Screen, Pointer Staff, Presentation, Script or Book Flagged or Lesson Plan in File, Board and Markers, and Models.

Time Plan

- Introduction : 05 Min
- History of Drones : 10 Min
- Classification of Drones : 15 Min
- Q & A Session : 10 Min

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I: Evolution of Drones.**
- **Part II: Classification of Drones.**

LEARNING OBJECTIVES

- **To understand the history and evolution of drones.**
- **To learn and understand the categorization of unmanned aircraft systems.**
- **Understanding the classification of unmanned aircraft systems.**

INTRODUCTION

1. A drone, in technological terms, is an unmanned aircraft. Essentially, its a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with on-board sensors and GPS. Drones can be rightly termed as “eye in the sky”.

PART I : EVOLUTION OF DRONES

2. **Early Beginnings**. The genesis and history of drones is a fascinating journey that spans centuries, evolving from early concepts to the advanced technology we see today.

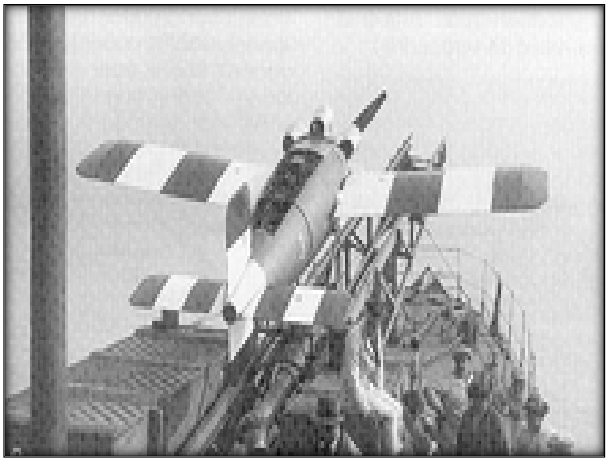
(a) **Ancient China**. The earliest use of unmanned flying devices can be traced back to ancient China, where kites were used for signaling, reconnaissance, and even lifting soldiers into the air.

(b) **Leonardo da Vinci**. In the late 15th century, da Vinci envisioned machines resembling birds and bats, capable of flight without a pilot.

3. **Military Roots**.

(a) **World War I**. The British military developed the "Aerial Target" to distract and confuse enemy defenses.

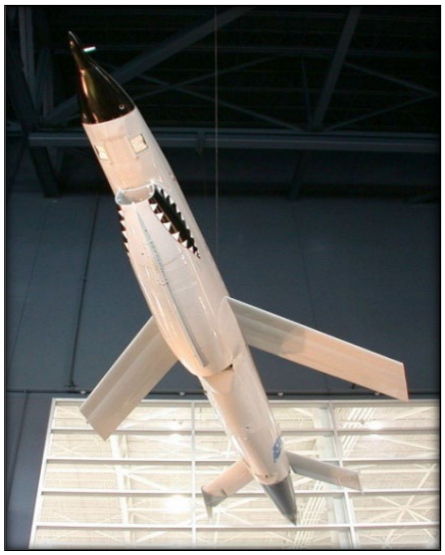
(b) **World War II**. Both the US and Germany made significant strides in drone technology. The US developed the "Radioplane OQ-2" for target practice, while Germany created the "V-1" flying bomb.



4. **Post-War Developments**.

(a) **1960s**. The US military began experimenting with remotely piloted aircraft for reconnaissance, leading to the development of the "Ryan Firebee".

(b) **1980s-1990s**. Drones started to be used for scientific research, environmental monitoring, and even entertainment.



5. **Modern Era.**

(a) **2000s**. The advent of GPS and advanced sensors led to significant advancements in drone technology.

(b) **2010s-Present**. Drones have become indispensable tools in various fields, including agriculture, delivery services, infrastructure inspection, and emergency response.

6. **Key Milestones**. Drones have come a long way from their early military origins to becoming versatile tools used in everyday life. Their evolution continues as technology advances, opening up new possibilities and applications. Some important milestones are as under:-

(a) **1849**. Austrian soldiers attacked the city of Venice with unmanned balloons filled with explosives.

(b) **1917.** The British "Aerial Target" was the first successful remote-controlled aircraft.

(c) **1935.** Reginald Denny developed the first civilian remotely piloted vehicle.

(d) **1960s**. The "Ryan Firebee" became one of the first successful remotely piloted drones.

Glossary of Terms.

7. **Drone**. It means an unmanned aircraft system.

8. **Drone Acknowledgement Number**. It denotes the unique number issued by the digital sky platform under the voluntary disclosure scheme for unmanned aircraft systems in India.

9. **Geo-fencing**. It means restricting the movement of unmanned aircraft system within a defined airspace

10 **Digital Sky Platform**. It refers to the online platform hosted by the Directorate General of Civil Aviation for various activities related to the management of unmanned aircraft system activities in India.

INTERESTING FACT

The global drone market size was estimated at USD 64.32 billion in 2023 and is projected to grow at a Compounded annual growth rate of 14.5% from 2024 to 2030, owing to various factors, such as advances in technology, broadening application portfolio across various industries, and plummeting costs of drone technology.

HIGHER ORDER THINKING SKILLS (HOTS)

- **Historical Impact.** How do you think the needs and innovations of wartime contributed to the evolution of drones?
- **Technological Evolution.** How did the key technological advancements in other fields made the early development of drones possible including radio signals?
- **Societal Influence.** Do you think the societal and political factors influenced the early use and development of drones? What impact did these factors have on the evolution of drone technology?

11. **Interesting Timelines.**

The next phase went from the swamps of Vietnam, to the remote hills and caves of Pakistan and Afghanistan. **The Predator air vehicle is 8.2m (27ft) long and has a 14.9m (49ft) wingspan. The system operates at an altitude of 7,620m (25,000ft) and has a range of around 740 Km.**	**US Army commissioned the Kettering Aerial Torpedo - the "Bug".** **The "Bug" after a predetermined length go time, an electrical circuit used to shut off the engine and the wings were released, causing the "Bug" to plunge to earth - where its 180 lbs of explosive detonated on impact.**

Winston Churchill, David Margesson and others wait to watch the launch of de Havilland Queen Bee target drone, 06 June 1941.	

"The drone revolution will change the way we live, work, and play." - Chris Anderson

PART II: CLASSIFICATION OF DRONES

12. Drones come in various types, each designed for specific applications and functions. They are categorized and classified in several ways.

Based on Design

13. **Multirotor Drones**.

(a) **Quadcopters**. Four rotors, used for aerial photography, surveillance, and recreational purposes.

(b) **Hexacopters**. Six rotors, offering more stability and payload capacity.

(c) **Octocopters**. Eight rotors, used for heavy-lift operations and high-end cinematography.

14. **Fixed-Wing Drones**.

(a) Similar to traditional aeroplanes, used for long-distance missions and high-endurance tasks.

(b) Commonly used in mapping, surveying, and agricultural monitoring.

15. **Hybrid VTOL Drones**.

(a) Capable of Vertical Take-off and Landing (VTOL) and efficient forward flight.

(b) Combine features of both multirotor and fixed-wing drones.

By Operational Use

16. **Model Remotely Piloted Aircraft System (MRPAS)**. Used for educational and research purposes without payload.

17. **Remotely Piloted Aircraft System (RPAS)**. Piloted from a remote pilot station for various purposes, including surveillance and deliveries.

18. **Autonomous Unmanned Aircraft System (AUAS)**. Operates autonomously without pilot intervention, often used in complex missions.

Based on Size and Weight

19. **The Unmanned Aircraft System (UAS)**. Based on the maximum all-up weight including payload, is classified as given in succeeding paragraphs.

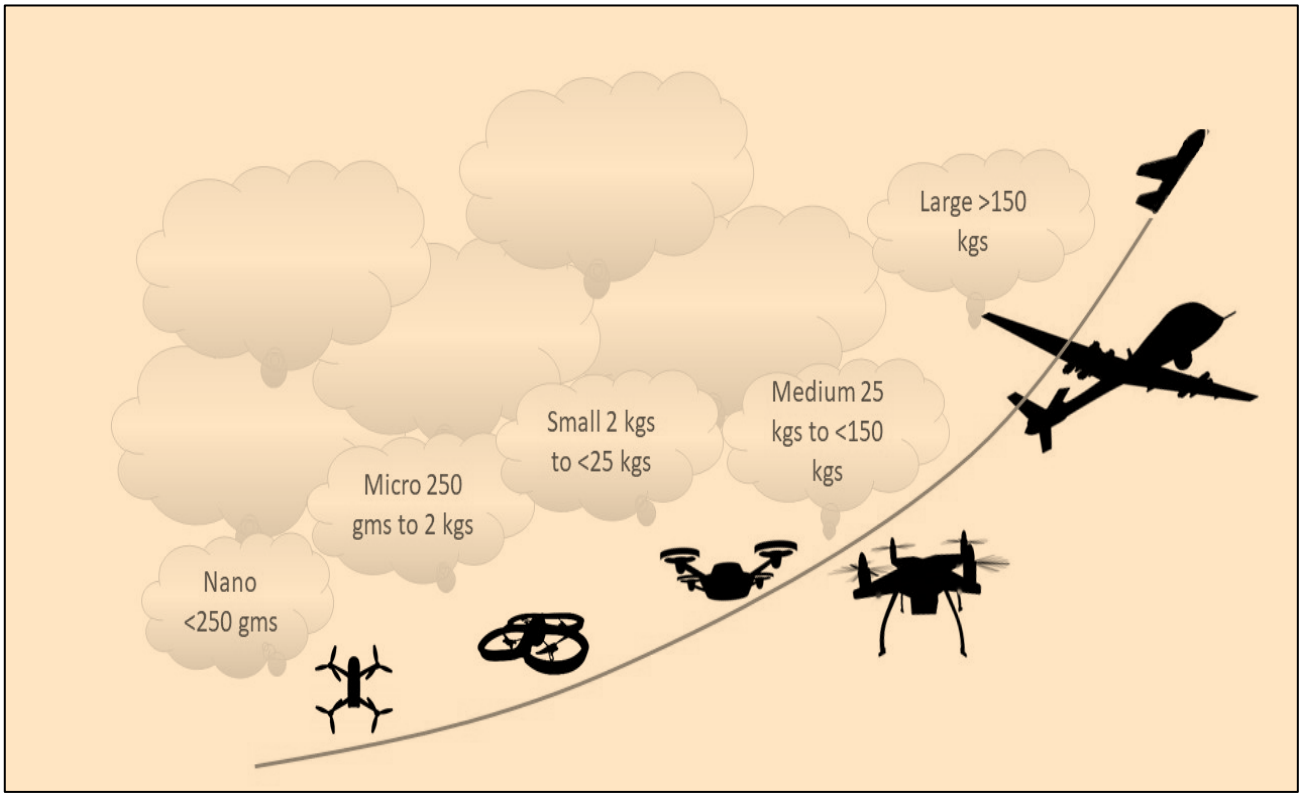
20. **Nano UAS**. Very small, often used for indoor flight and educational purposes, weighing less than or equal to 250 grams.

21. **Micro UAS**. Slightly larger than Nano drones, used for hobbyist activities and short-range surveillance, weighing more than 250 grams, but less than or equal to 2 kg.

22. **Small UAS**. Compact drones for consumer use, often used for photography and racing, weighing more than 2 kg but less than or equal to 25 kg.

23. **Medium UAS**. Used in commercial applications such as delivery and industrial inspections, weighing more than 25 kg, but less than or equal to 150 kg.

24. **Large UAS**. Heavy-duty drones used in military, cargo transport, and long-endurance surveillance missions, weighing more than 150 kg.



Based on Usage

25. **Commercial Drones**. Used in agriculture, delivery services, infrastructure inspection, and filmmaking.

26. **Military Drones**. Used for reconnaissance, combat operations, and surveillance.

27. **Recreational Drones**. Used by hobbyists for fun, aerial photography, and racing.

28. **Industrial Drones**. Used in construction, mining, and energy sectors for inspection and monitoring.

29. **Scientific Drones**. Used in research, environmental monitoring, and wildlife tracking.

Scope of Drone Operations

30. These categories are critical in understanding the scope and limitations of drone operations, influencing both technological development and regulatory frameworks. An overview of **VLOS (Visual Line of Sight)** and **BVLOS (Beyond Visual Line of Sight)** in drone operations is given in succeeding paragraphs.

31. **Visual Line of Sight (VLOS).**

(a) **Definition**. The drone is always flown within the pilot's visual line of sight.

(b) **Visibility**. The pilot must be able to see the drone without any visual aids (e.g., binoculars or FPV goggles).

(c) **Safety**. The pilot can monitor the airspace for potential hazards and maintain control of the drone.

(d) **Distance**. Typically, the maximum visibility is around 500 meters (1640 feet), but this can vary based on factors like drone size, environment, and weather conditions.

32. **Beyond Visual Line of Sight (BVLOS)**.

(a) **Definition**. The drone is flown beyond the pilot's visual line of sight.

(b) **Visibility**. The pilot does not have direct visual contact with the drone.

(c) **Safety**. Requires advanced planning, reliable communication systems, and often additional safety measures.

(d) **Applications**. Used for long-range missions, such as infrastructure inspection, delivery services, and large-scale agricultural monitoring.

33. **Key Differences**.

(a) **Control**. In VLOS, the pilot directly controls the drone. In BVLOS, the drone may operate autonomously or with remote control.

(b) **Regulations**. BVLOS operations typically require special permissions and certifications due to the increased complexity and safety considerations.

34. BVLOS operations hold great potential for expanding the capabilities of drones, but they also come with additional challenges and regulatory requirements

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HIGHER ORDER THINKING SKILLS (HOTS)

- **Predictive Analysis**. Having seen the evolution, what future trends can you visualize in drone technology?
- **Comparative Analysis.** Compare the initial military uses of drones to their modern day applications.

CONCLUSION

35. Drones, once a futuristic concept, have rapidly evolved into versatile tools with a wide range of applications. From their humble beginnings as military targets to their current role in various industries, drones have transformed the way we perceive and interact with the world.

36. **Key Takeaways from the Evolution of Drones.**

(a) **Technological Advancements**. The integration of GPS, advanced sensors, and autonomous flight capabilities has significantly enhanced drone performance and functionality.

(b) **Diverse Applications**. Drones are used in sectors such as agriculture, logistics, construction, and entertainment, offering innovative solutions to complex challenges.

(c) **Regulatory Framework**. The development of comprehensive regulations is crucial to ensure the safe and responsible use of drones.

(d) **Future Potential**. As technology continues to advance, drones are poised to revolutionize industries and redefine the possibilities of aerial operations.

37. By understanding the history, types, and applications of drones, we can appreciate their transformative impact and anticipate their future potential.

SUMMARY

- The concept of drones dates back to 1849.
- 1915-1920 saw a giant leap forward in drone technology.
- The first pilotless aircraft was developed in 1916.
- In the 1930s, the U.S. Navy began experimenting with radio-controlled aircraft.
- " Drone Acknowledgement Number" means the unique number issued by the digital sky platform.
- "Digital Sky Platform" means the online platform hosted by the DGCA.
- The UAS is categorised as Aeroplane, Rotorcraft and Hybrid.
- UAS is based on the maximum all-up weight.
- **Multirotor Drones**. Quadcopters, Hexacopter, Octocopters.
- **Fixed-Wing Drones**. Airplane-like drones.
- **Hybrid VTOL Drones**. Combines multirotor and fixed-wing features.
- **MRPAS**. Model Remotely Piloted Aircraft System
- **RPAS**. Remotely Piloted Aircraft System
- **AUAS**. Autonomous Unmanned Aircraft System
- **VLOS (Visual Line of Sight)**. Pilot maintains visual contact.
- **BVLOS (Beyond Visual Line of Sight)**. Drone operates autonomously or with remote control.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. What does the term "Drone" refer to?

(a) A manned aircraft system

(b) A remote control vehicle

(c) An unmanned aircraft system

(d) A satellite-based communication system

Q2. What is a "Drone acknowledgement number"?

(a) The registration number issued for manned aircrafts

(b) The unique number issued by the digital sky platform for unmanned aircraft systems

(c) A tracking number for drone deliveries

(d) A pilot's certification number

Q3. Which of the following is NOT a person subject to the Drone Rules?

(a) A person owning a drone

(b) A person operating a drone in India

(c) A person selling manned aircraft

(d) A person maintaining a drone

Q4. To which unmanned aircraft systems do the Aircraft Rules, 1937 still apply?

(a) Drones used by private companies

(b) Unmanned aircraft systems with a maximum all-up-weight of more than 500 kilograms

(c) All drones regardless of weight

(d) Drones operated for research purposes

Q5. Which entity operates the "Digital Sky Platform"?

(a) The Indian Navy

(b) The Ministry of Communications

(c) The Directorate General of Civil Aviation

(d) The Indian Meteorological Department

Q6. What is the primary characteristic of an "Aeroplane" in the context of unmanned aircraft systems?

(a) It is a lighter-than-air aircraft.

(b) It derives lift from fixed aerodynamic surfaces.

(c) It uses rotors for lift during flight.

(d) It relies on engine thrust only for lift.

Q7. How is a "Rotorcraft" supported in flight?

(a) By a fixed-wing surface

(b) By the reactions of air on one or more power-driven rotors on vertical axes.

(c) By gliding on air currents.

(d) By a combination of fixed-wing and rotor-based mechanisms.

Q8. Which of the following best describes a "Hybrid Unmanned Aircraft System"?

(a) It relies on fixed surfaces for vertical and horizontal flight.

(b) It is supported by rotating airfoils during vertical flight only.

(c) It is capable of vertical take-off and uses non-rotating airfoils during horizontal flight.

(d) It has no capability for vertical take-off and landing.

Q9. Which of the following is NOT a sub-category of unmanned aircraft systems?

(a) Remotely piloted aircraft system

(b) Autonomous unmanned aircraft system

(c) Semi-autonomous manned aircraft system

(d) Model remotely piloted aircraft system

Q10. What is the maximum weight limit for a Nano UAS?

(a) 250 grams

(b) 2 kilograms

(c) 25 kilograms

(d) 150 kilograms

Q11. Which classification includes unmanned aircraft weighing more than 250 grams but less than or equal to 2 kilograms?

(a) Nano UAS (b) Micro UAS

(c) Small UAS (d) Medium UAS

Q12. Which classification applies to unmanned aircraft weighing more than 25 kilograms but less than or equal to 150 kilograms?

(a) Nano UAS

(b) Small UAS

(c) Medium UAS

(d) Large UAS

Q13. Which category of unmanned aircraft includes vehicles weighing more than 150 kilograms?

(a) Small UAS

(b) Medium UAS

(c) Large UAS

(d) Micro UAS

Q14. What is the primary function of a "Remotely piloted aircraft system"?

(a) It operates autonomously with no human intervention.

(b) It is controlled by a human operator using a remote system.

(c) It is used for recreational purposes only.

(d) It is controlled by on-board pilots.

Q15. Which of the following unmanned aircraft systems can perform vertical take-off and landing?

(a) Aeroplane

(b) Rotorcraft

(c) Hybrid unmanned aircraft system

(d) Nano UAS

FILL IN THE BLANKS

Q1. The _____ is an online platform for managing unmanned aircraft systems activities in India.

Q2. The _____ Rules, 1937 do not apply to unmanned aircraft systems except those with a maximum all-up-weight of more than 500 kilograms.

Q3. An unmanned aircraft system used by the naval, military, or air forces of India is _____ from the Drone Rules.

Q4. A "Drone acknowledgement number" is issued by the _____ under the voluntary disclosure scheme.

Q5. The Drone Rules apply to all unmanned aircraft systems that are being operated in or over _____.

DRONES

CHAPTER D II: BASIC PRINCIPLES OF FLIGHT

INTRODUCTION

1. Aerodynamics plays a crucial role in designing aircraft to maximise efficiency and safety. Understanding how air interacts with the aircraft's surfaces helps engineers improve performance and stability. These principles are fundamental to the science of aviation, ensuring that aircraft can fly safely and efficiently through the balance of these forces and controls.

2. The basic principles of flight for drones are similar to those of fixed-wing and rotary, aircrafts but they are more specialized due to their unique design and technology. To stay in the air, like aircrafts, drones also rely on four main forces of **lift**, **weight**, **thrust**, and **drag**. Drone technology is woven around the interplay of these forces.

TEACHING INSTRUCTIONS

Period : One (01)

Type : Lecture and Presentation

Year : 2nd Year JD/JW

Conducting Officer : Officer/ Trained PI/AMI/CGI

Training Aids : Class Room, Computer with OHP, Screen, Pointer Staff, Presentation, Script or Book Flagged or Lesson Plan in File, Board and Markers, and Models.

Time Plan

- Fundamental of Flight : 15 Min
- Takeoff, Flight, and Landings : 15 Min
- Maneuvers and Turns : 10 Min

PREVIEW

The lecture will be conducted in the following parts:-

- Part I : Evolution of Drones
- Part II : Classification of Drones

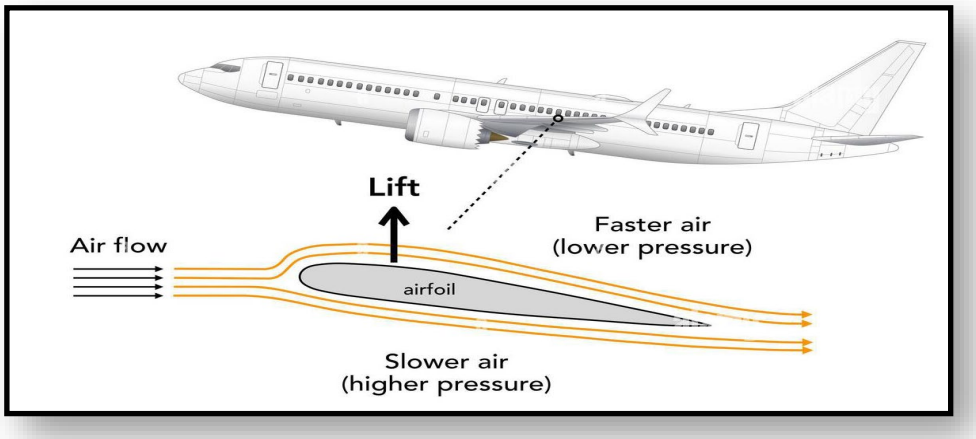
LEARNING OBJECTIVES

- To understand the basic principle of flight.
- To learn about primary controls & movements.
- Understanding the aircraft manoeuvers and circuit pattern.

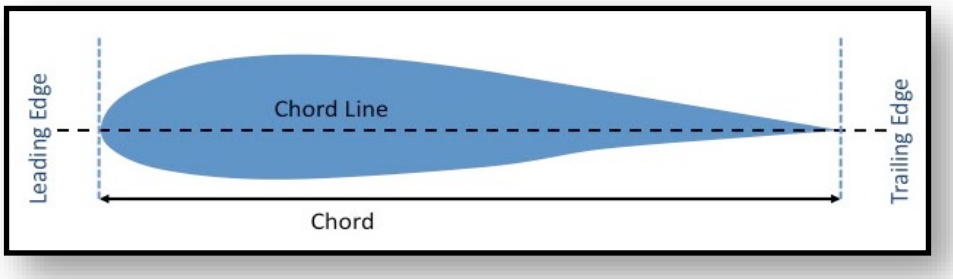
PART I : FUNDAMENTALS OF FLIGHT

Glossary of Terms

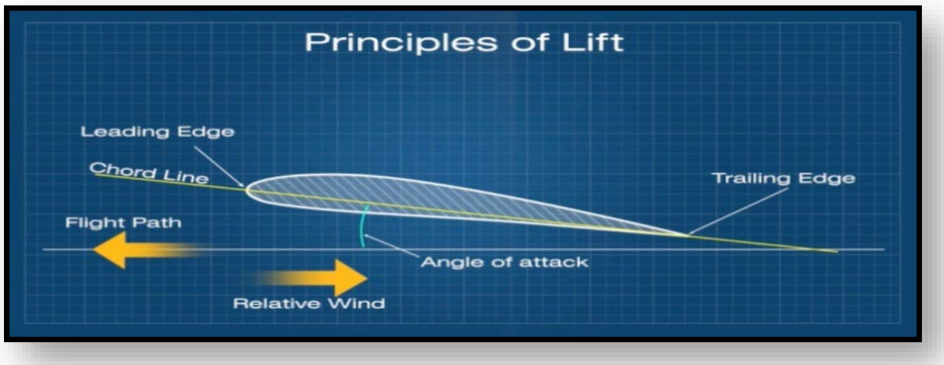
3. **Airfoil**. An **Airfoil** is a streamlined shape designed to produce more lift than drag when moving through a fluid.



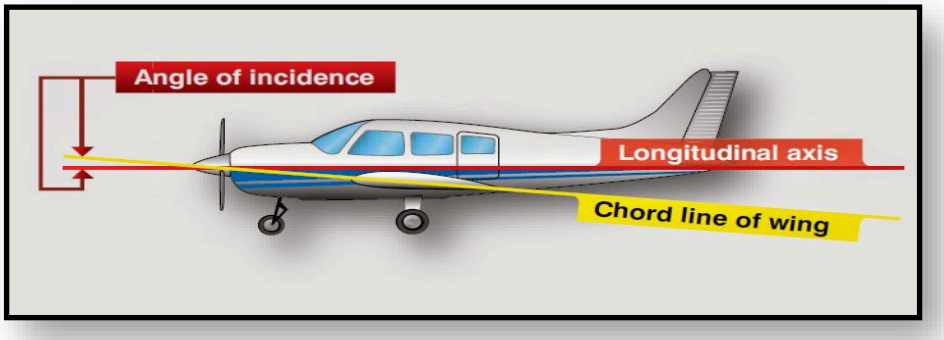
4. **Chord Line**. It is a line joining the centres of curvature of leading and trailing edges of an airfoil section.



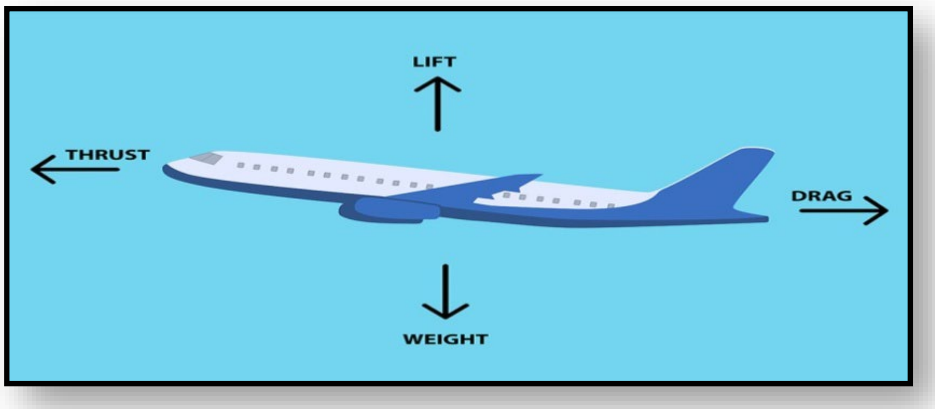
5. **Angle of Attack (AoA)**. It is an angle between the chord line of the airfoil and the relative airflow.



6. **Angle of Incidence**. The angle between the chord line and the longitudinal axis of the aircraft is called Angle of Incidence.



7. The four forces making up the principle of flight are **lift**, **weight**, **drag**, and **thrust**. The forces all interact together to determine an airplane's trajectory. Lift and weight are opposing forces, as are thrust and drag. All are equally important, and they must be balanced to maintain a level flight.



PART II: CONTROL SURFACES AND AXIS OF AN AIRCRAFT

8. The control surfaces work in conjunction with the aircraft's axis of rotation to provide precise control over its flight path. By understanding these fundamental principles, pilots can safely and efficiently manoeuver their aircraft. An aircraft's ability to manoeuver in three dimensions is made possible by its control surfaces and axis of rotation. These elements work in tandem to allow pilots to precisely control the aircraft's flight path.

9. **Control Surfaces**.

(a) **Ailerons**. These are hinged sections on the trailing edge of each wing. By deflecting the ailerons differentially, the pilot can create a difference in lift between the wings, causing the aircraft to roll.

(b) **Elevators**. These are hinged sections on the trailing edge of the horizontal stabilizer. By deflecting the elevators up or down, the pilot can control the pitch of the aircraft.

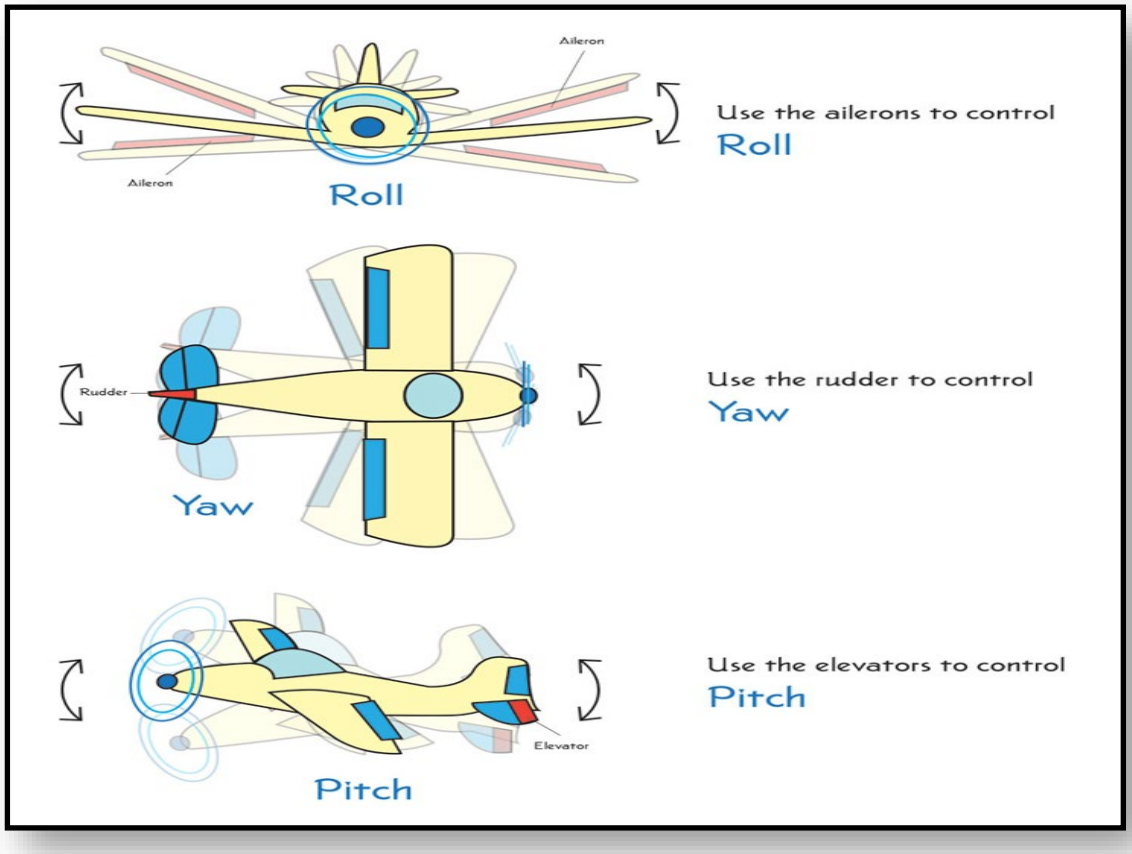
(c) **Rudder**. The rudder is a hinged section on the trailing edge of the vertical stabilizer. By deflecting the rudder left or right, the pilot can control the yaw of the aircraft.

10. **Axis of Rotation**.

(a) **Lateral Axis (Roll)**. This axis runs from wingtip to wingtip. Rolling the aircraft involves tilting its wings left or right.

(b) **Longitudinal Axis (Pitch)**. This axis runs from the nose to the tail of the aircraft. Pitching involves raising or lowering the nose of the aircraft.

(c) **Vertical Axis (Yaw)**. This axis runs vertically through the aircraft's center of gravity. Yawing involves turning the nose of the aircraft left or right.



PART III: MANOEUVRES, PHASES AND CIRCUIT PATTERN

11. **Basic Aircraft Manoeuvres**. In aviation, manoeuvers and turns are essential techniques pilots use to control their aircraft.

(a) **Straight and Level Flight**. Maintaining a constant altitude and heading.

(b) **Climbs**. Increasing altitude by increasing the angle of attack and/or thrust.

(c) **Descents**. Decreasing altitude by reducing thrust and/or increasing the angle of attack.

(d) **Turns**. Changing direction by banking the aircraft and adjusting the rudder.

12. **Phases of Flight**. The **phases of flight** describe the various stages an aircraft goes through from the moment it starts moving on the ground until it comes to a complete stop after landing. Understanding these phases is crucial for ensuring safety and efficiency in aviation.

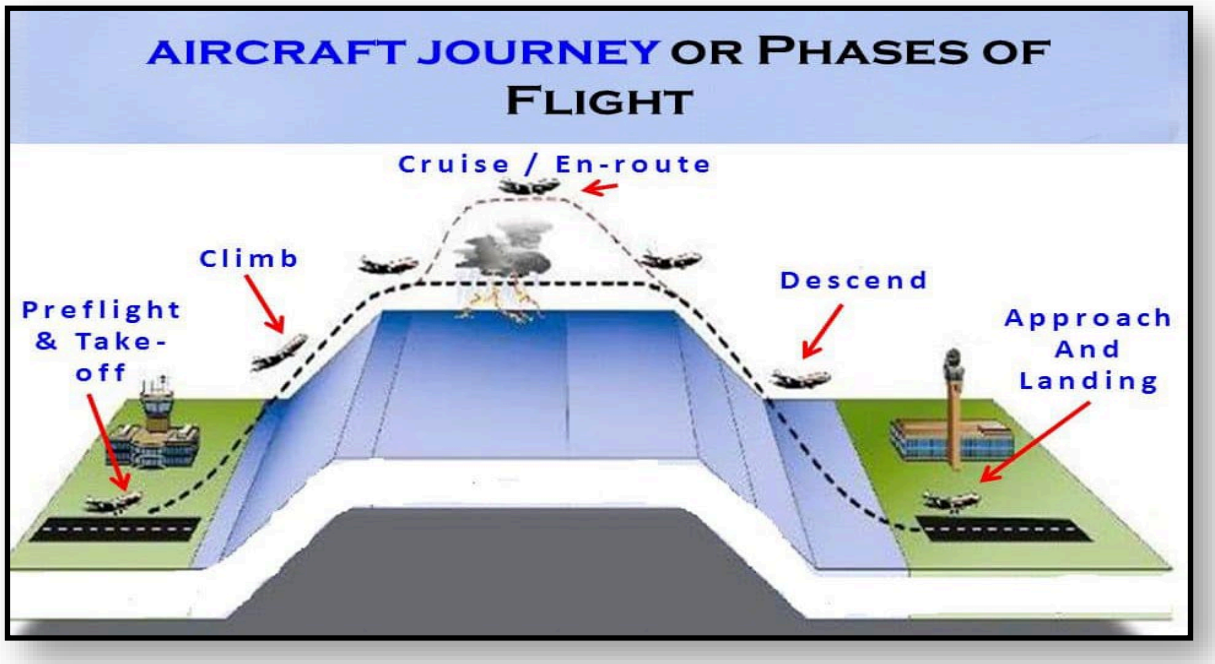
(a) **Takeoff**. When the aircraft accelerates along the runway and lifts off the ground, it is called ‘takeoff’.

(b) **Climb**. When the aircraft gains altitude after takeoff, it is called ‘climb’.

(c) **Cruise**. When the aircraft maintains a steady altitude and speed, it is called 'Cruise'.

(d) **Descent**. When the aircraft loses altitude before landing, it is called a 'descent'.

(e) **Landing**. When the aircraft slows down and touches down on the runway safely, it called a 'landing'.



13. Understanding these phases helps pilots, air traffic controllers, and ground crew to coordinate and ensure the safety and efficiency of flight operations. Each phase has specific procedures and protocols to maintain safety and compliance with aviation regulations. These well-defined stages not only ensure smooth operations but also enhance the overall flying experience for passengers.

14. **Circuit Pattern.** A circuit pattern is a standardized flight path used by pilots to practice basic flying skills and approach landing procedures. By understanding these fundamental manoeuvers, turns, and circuit patterns, pilots can safely and efficiently operate their aircraft. They typically involve the following stages:

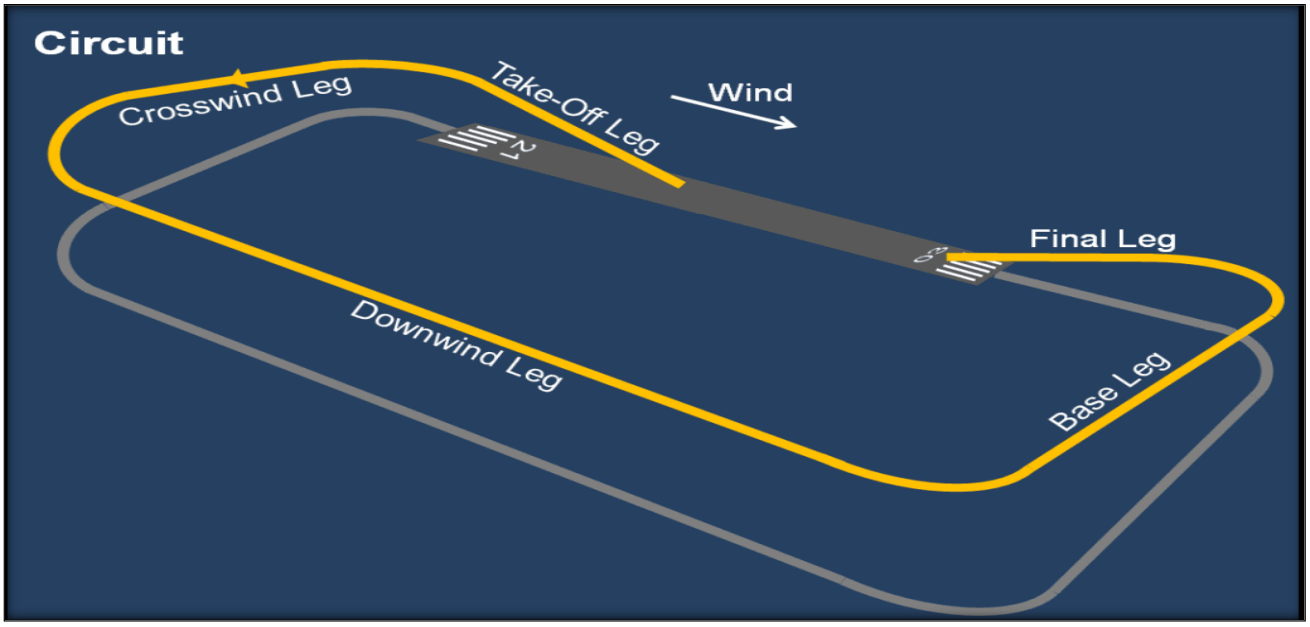
(a) **Take-off Leg**. The aircraft flies into the wind to maintain stability.

(b) **Crosswind Leg**. The aircraft turns to fly perpendicular to the wind.

(c) **Downwind Leg**. The aircraft flies perpendicular to runway and with the wind to gain speed.

(d) **Base Leg**. The aircraft turns towards the runway.

(e) **Final Approach**. The aircraft descends and aligns with the runway.



HIGHER ORDER THINKING SKILLS (HOTS)

- **Critical Analysis**. Evaluate how the principles of flight can be applied to improve the design of energy efficient drones. What specific design changes would you propose and why?

- **Synthesis and Application**. Imagine a scenario where drones are used to deliver critical supplies in a disaster struck area. How would you plan the flight path and design to ensure maximum efficiency and reliability under unpredictable weather conditions?

- **Comparative Evaluation**. Compare the aerodynamic principles of traditional fixed wing aircraft and multi rotor drones. How do these differences influence their respective flight performance and applications?

- **Problem Solving**. What are the key challenges in maintaining stable flight in high altitude environments for drones? What potential technological advancements can address the same?

- **Ethical and Societal Implications**. What can be the societal impact of widespread drone usage for delivery services?

CONCLUSION

15. Understanding the fundamental principles of flight is essential for appreciating the complex interplay of forces that allow aircraft to soar through the skies.

16. **Key Principles**.

(a) **Aerodynamics**. The study of air in motion and its interaction with solid surfaces, particularly the airfoil shape of aircraft wings.

(b) **Four Forces of Flight**. **Lift**, **weight, thrust, and drag** are the four primary forces acting on an aircraft. A balance of these forces is necessary for stable flight.

(c) **Control Surfaces**. Ailerons, elevators, and rudders enable pilots to control the aircraft's pitch, roll, and yaw.

17. By mastering these principles, pilots can safely and efficiently operate aircraft, ensuring the continued advancement of aviation technology and its contribution to global connectivity.

SUMMARY

- An Airfoil is a streamlined shape designed to produce more lift than drag.
- Chord Line is a line joining the centers of curvature of leading and trailing edges of an airfoil section.
- Angle Of Attack is an angle between the chord line of an airfoil and the relative air flow.
- Angle Of Incidence is the angle between the chord line and the longitudinal axis of the aircraft.
- The four forces are **lift, weight, drag, and thrust**.
- There are three axis around which all aircraft move.
- The primary controls are the ailerons, elevator, and the rudder.
- There are four fundamental basic flight maneuvers upon which all flying tasks are based.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Which of the following is NOT one of the four forces of flight?

(a) Lift (b) Weight

(c) Friction (d) Thrust

Q2. Which two forces are directly opposing in flight?

(a) Lift and drag (b) Thrust and weight

(c) Lift and weight (d) Drag and lift

Q3. What is the primary function of ailerons on an aircraft?

(a) To control yaw (b) To control pitch

(c) To control roll (d) To control thrust

Q4. What does the rudder control on an aircraft?

(a) Pitch (b) Roll

(c) Yaw (d) Lift

Q5. Around which axis does an aircraft pitch?

(a) Longitudinal (b) Vertical

(c) Lateral (d) Diagonal

Q6. Which axis controls the yaw of an aircraft?

(a) Longitudinal (b) Vertical

(c) Lateral (d) Diagonal

Q7. Which of the following is required for heavier-than-air flight?

(a) Drag must exceed thrust (b) Weight must exceed lift

(c) Lift must balance weight (d) Thrust must balance drag

Q8. Which aircraft phase involves the transition from moving on the ground to flying in the air?

(a) Landing (b) Takeoff

(c) Taxiing (d) Climbing

Q9. Which aircraft type does NOT require a runway for takeoff?

(a) Fixed-wing aircraft (b) Helicopters

(c) Commercial jets (d) Airliners

Q10. What is the last phase of flight where an aircraft returns to the ground?

(a) Takeoff (b) Climb

(c) Descent (d) Landing

Q11. Which manoeuvre is NOT one of the four basic flight manoeuvres?

(a) Turns (b) Climbs

(c) Spirals (d) Descents

Q12. What is the purpose of the elevator in an aircraft?

(a) To control roll (b) To control pitch

(c) To control yaw (d) To control lift

Q13. What flight manoeuvre involves increasing the altitude of the aircraft?

(a) Turn (b) Climb

(c) Descent (d) Roll

Q14. What is the key factor to manage during landing to ensure a safe descent?

(a) Pitch control (b) Lift and weight balance

(c) Thrust exceeding drag (d) Straight-and-level flight

Q15. What is the primary focus of circuit flying?

(a) Practicing aerobatics (b) Learning take-offs, turns, and landings

(c) Flying in adverse weather (d) Mastering high-speed flight

True or False

Q1. Lift and weight must be equal to maintain level flight.

Q2. The rudder controls the roll of the aircraft.

Q3. Thrust is the force that opposes drag.

Q4. The elevator controls the yaw of an aircraft.

Q5. An aircraft pitches around its longitudinal axis.

Q6. Landing requires balancing lift and weight for a safe descent.

Q7. Heavier-than-air flight requires drag to exceed thrust.

Q8. The vertical axis of an aircraft is responsible for yaw movements.

Q9. Ailerons are primarily used to control the pitch of the aircraft.

Q10. Takeoff is the phase of flight where an aircraft transitions from ground movement to air travel.

Q11. Helicopters and VTOL aircraft do not need a runway for takeoff.

Q12. During straight-and-level flight, all forces (lift, weight, drag, and thrust) are balanced.

Q13. Turns, climbs, descents, and rolls are the four fundamental flight manoeuvres.

Q14. Circuit flying helps develop a pilot’s ability to separate and manage air traffic.

Q15. A climb is when an aircraft loses altitude.

DRONES

CHAPTER D III: APPLICATION OF DRONES

INTRODUCTION

1. Drone is a very versatile equipment because they can be flown remotely. It has an exceptional quality of taking aerial photos and videos, giving a splendid view from the sky. Plus, they are handy for delivering packages, especially to those in hard-to-reach places. These are just a few examples of the many uses of drones that make them immensely valuable.

TEACHING INSTRUCTIONS

Period : One (01)

Type : Lecture and Presentation

Year : 2nd Year JD/JW

Conducting Officer : Officer of the Unit

Training Aids : Class Room, Computer with OHP, Screen, Pointer Staff, Presentation, Script or Book Flagged or Lesson Plan in File, Board and Markers, and Models.

Time Plan

- Application of Drones in Various fields : 20 Min
- Search & Rescue and Disaster response : 10 Min

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I: Application of Drones in Various Fields.**
- **Part II: Search & Rescue and Disaster Response.**

LEARNING OBJECTIVES

- **To know the application & usage of drones.**
- **To know how the drones are helpful in search & rescue mission.**

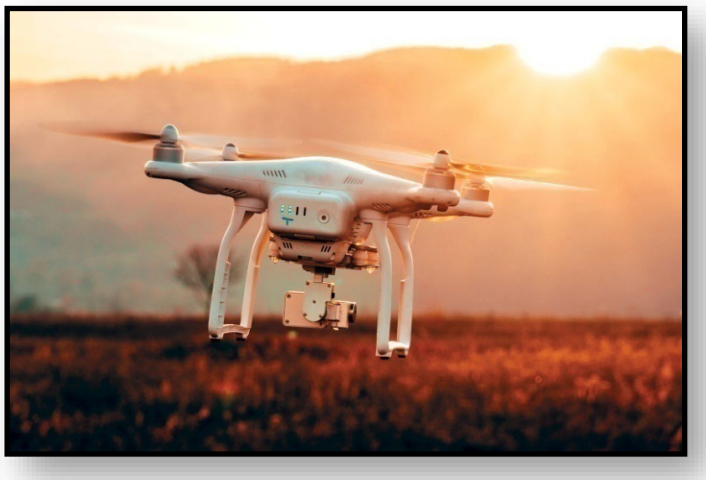
PART I: APPLICATION OF DRONES

2. Farmers now use drones to check their crops from a bird's eye view. These are the changing technology. And it is not just for them-drones are also used in search and rescue mission to find people in difficult spots. This new use of drones is changing farming and emergency response incredibly.

3. Use of drones is on the rise, with industries finding innovative ways to utilise this technology. Other than Military Some of the most common uses of drones include.

Aerial Photography and Videography.

4. Drones have revolutionized film and TV production. Now, getting amazing shots is easier and cheaper. Filmmakers can pull off complex shots without cranes or helicopters. They can zip through tight spaces, track moving subjects, and capture dynamic angles. This makes stories more engaging and visually exciting. Plus, the cost is lower, so even small teams can create stunning visuals. This technology has opened up creative possibilities and sparked innovation in the industry.



Construction and Infrastructure Inspection.

5. In construction, drones make surveying land, monitoring progress, and inspecting structures easy and fast. They quickly cover large areas and take detailed images to keep projects on track. High-resolution photos and videos help with mapping, measuring, and comparing against blueprints. This helps engineers spot problems early and make smart decisions about materials, timing, and labor. Once a structure is done, drones can also handle inspections, reaching hard-to-access spots without risking workers' safety. This technology keeps everyone safe and provides accurate data on building conditions. Commercial use of drones in construction is rapidly growing due to these benefits.

Agriculture.

6. Drones are revolutionizing agriculture by improving how we manage crops. They can quickly survey large areas, creating detailed maps that show plant health and soil moisture. This helps farmers spot issues like pests or nutrient problems early and take action. The result is less waste, higher yields, and resource savings. Plus, they can assist with precise spraying and seed planting, making farming more efficient. This is one of the key drone applications enhancing modern farming.

Energy Sector.

7. Drones are changing the energy sector by making maintenance and inspections easier and cheaper. They reach tough spots like wind turbines and power lines, spotting issues early. This technology saves time, reduces worker risks, and keeps energy systems running smoothly. Drone uses for business in the energy sector are proving to be highly efficient and cost-effective.

8. Another application of drones for inspection is in industries which utilize pipelines, cell towers and railways. Using a drone, people can safely identify problems in:

(a) Pipelines

(b) Power lines

(c) Cell towers

(d) Cooling towers

(e) Solar panels

(f) Windmills or wind turbines

(g) All types of critical infrastructure

Environmental Monitoring and Conservation.

9. Drones are an asset for environmental monitoring and conservation. They capture high-quality images and data, helping us track changes in landscapes and wildlife. This info supports conservation efforts and helps researchers understand human impact on nature. They also help monitor illegal activities like poaching and deforestation, protecting our planet's resources. This drone application is vital for sustainable development and conservation.

Delivery and Logistics.

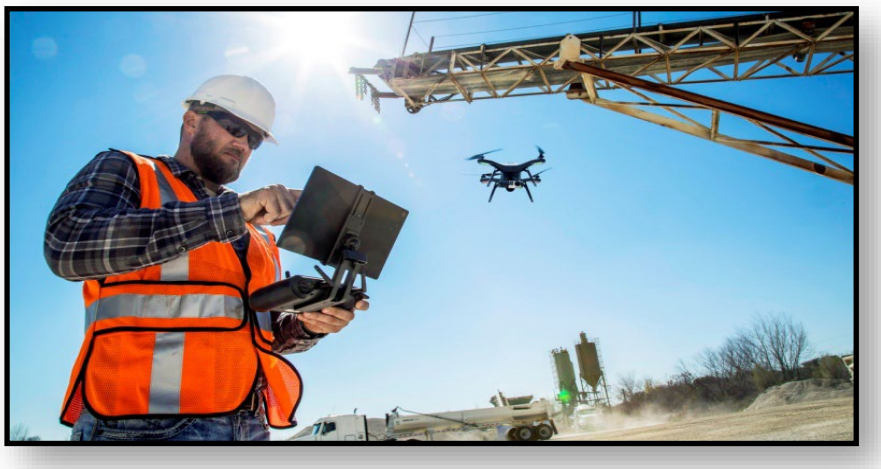
10. Companies like Amazon are testing drone delivery services and integrating these flying robots into delivery and logistics. Drones can navigate through traffic and reach remote or hard-to-access locations quickly, making them ideal for urgent deliveries. This technology could revolutionize the transportation industry by reducing costs and increasing efficiency. Commercial use of drones in logistics is set to transform the industry.

Real Estate and Property Management.

11. The use of drones in real estate has opened up new possibilities for property management companies. Drones can provide detailed aerial footage of properties, giving potential buyers or renters a better understanding of the space. This technology can also aid in property inspections and maintenance by quickly identifying any issues that need to be addressed. Drone applications in real estate are enhancing the way properties are marketed and managed.

Mining and Surveying.

12. The mining industry has been revolutionized by drones, offering a safer and more efficient method to survey and map mining sites. They can quickly cover large areas, enabling companies to locate mineral deposits and plan extraction processes with precision. Additionally, drones enhance safety by conducting inspections without endangering workers. This technology has significantly boosted efficiency and productivity in the mining sector. Commercial uses for drones in mining are becoming increasingly common.



Wildlife Monitoring.

13. Poaching is one of the biggest problems for wildlife conservation areas around the globe. While many technologies are researched and considered for eradicating the problem, one of the most effective ways of bringing an end to poaching has been through drones. But poaching is not the only reason why drones are gaining traction in wildlife conservation. There are other applications of these birds too.

14. The use of drones for wildlife monitoring is more effective because they do not disturb wildlife and can easily cover larger areas.

Drones in the Military.

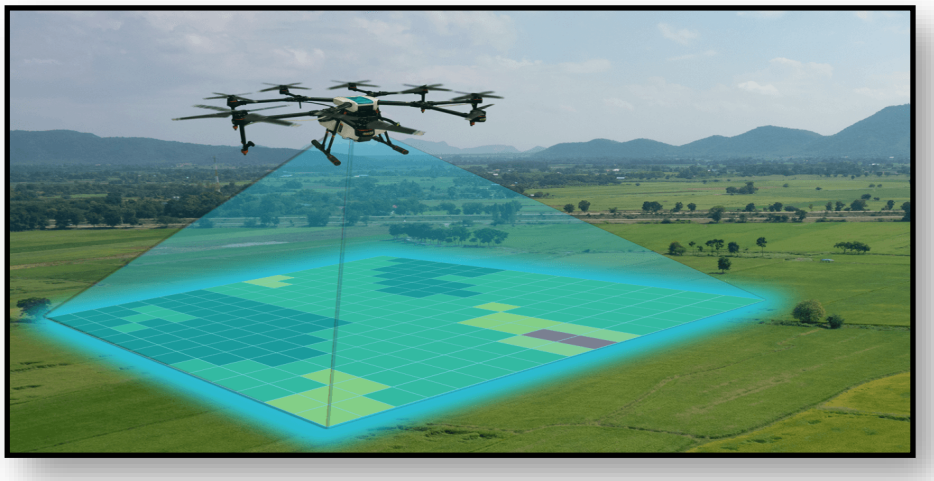
15. Drones were created mainly for military purposes. Their use in all other areas that we have discussed above is but secondary. Countries at war have been using drones for a substantial period of time dating back as early as World War I. Use of Drones made a lot of sense in wars given the fact that the life of pilots don't have to be risked and you get to know about enemy formation and enemy activities deep inside the enemy territory.

16. Today, drones are available in many forms and sizes and are used by numerous countries around the world. They have played a role in predicting conflicts and also in helping countries fight wars with fewer casualties.

Aerial Survey for Maps.

17. Aerial photos serve a very important purpose in topographic maps. Since places keep changing with time, aerial photos help cartographers map a region. This is often referred as photogrammetric scanning. Drones can be used for photographing the area aerially. Data from the drones can be quickly obtained. This is why survey businesses are beginning to use drones instead of relying on traditional methods.

18. The ortho photograph and surface models obtained through drones can help the surveyors save time and quickly complete the survey for a region. Many surveyors see this as a cost-effective method of surveying where less manpower and even less time is needed to complete the entire work.



Key Benefits of Using Drones.

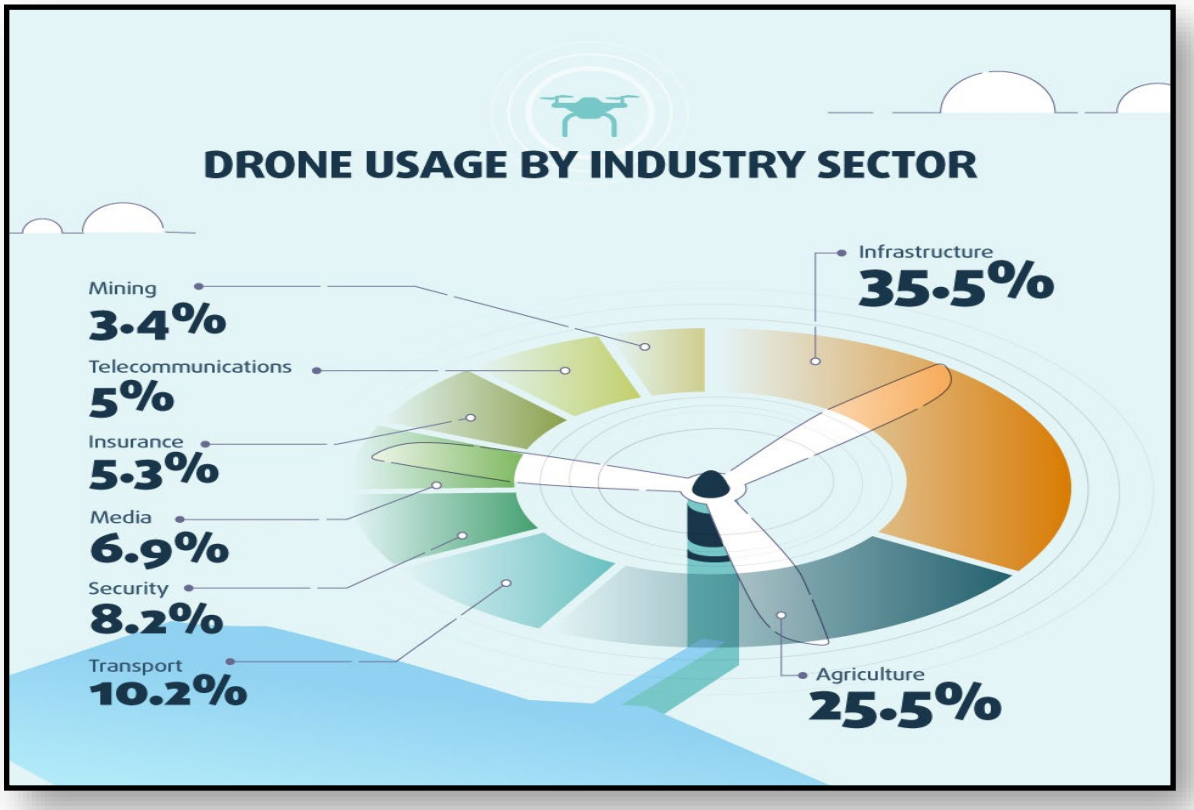
19. **Cost-effective**. Drones are much more affordable than traditional methods like helicopters or cranes, making them accessible to smaller production teams and industries.

20. **Efficiency**. Drones can cover large areas quickly and provide high-resolution images and data in a fraction of the time as compared to traditional methods. This saves time, resources, and labour costs.

21. **Versatile**. Drones can be equipped with different cameras and tools depending on the specific needs of each industry. This versatility makes them useful in various applications such as aerial photography, mapping, surveying, delivery etc.

22. **Safety**. Drones eliminate the need for workers to access dangerous or hard-to-reach areas, making operations safer for everyone involved. They also are equipped with advanced collision avoidance technology to prevent accidents.

23. **Eco-friendly**. Drones reduce the need for traditional methods that emit harmful pollutants, making them a more environmental friendly option for various industries.



PART II : DISASTER MANAGEMENT AND RESPONSE

Search and Rescue Operations.

24. Drones are super advanced now, with high resolution cameras and thermal imaging. They can quickly scan wide areas to find survivors, which is an advantage vis-a-vis traditional methods are too slow or risky. For example, after an earthquake, they can help rescuers find trapped people by detecting body heat. Plus, they can access hard-to-reach or dangerous places, letting rescue teams provide help fast without risking any lives.

Damage Assessment.

25. After a disaster, it is very important to quickly check the damage to plan recovery. Drones can fly around and take detailed pictures, giving authorities a quick and clear overview. This helps understand the impact and prioritize efforts. Using drones is quicker and more accurate than doing inspections on foot, leading to faster decisions and quicker resource deployment where needed most. Drones offer great support for efficient disaster response.

Public Safety and Law Enforcement.

26. **Crime Scene Analysis**. Drones are changing how we analyze crime scenes by providing detailed aerial views. They take high-resolution images from various angles, helping us spot details we might miss on the ground. This helps preserve evidence and document it efficiently, assisting law enforcement in building stronger cases and solving crimes faster. Besides, use of Drones mean that we don't disturb the crime scene, thus keeping its integrity intact.

27. **Crowd Monitoring**. Handling large crowds at events can be tough for police, but drones make it easier. They fly overhead, watch crowd movements in real-time, and give a view that ground officers can't get. This helps spot issues like overcrowding or disturbances quickly, so responses are faster. Drones improve public safety and help events run smoothly. They are cost-effective and reduce the need for many police force, making the atmosphere more comfortable for everyone.

28. **Public Safety**. Public safety agencies like police, fire departments, and search and rescue teams find drones very useful. With thermal cameras, they can locate missing persons or detect fire hotspots. This helps emergency personnel respond quickly and safely. During disasters, drone gives real-time aerial view to assess damage, find survivors, and map the affected areas. They can also deliver medical supplies or rescue gear to hard-to-reach places. This is a critical drone use that enhances public safety operations.

HIGHER ORDER THINKING SKILLS (HOTS)

- **Innovative Solutions**. Imagine you are tasked with developing a drone-based solution for urban traffic management. How would you design the system to optimise traffic flow and reduce congestion?

- **Ethical Implications**. Discuss the ethical considerations of using drones for public surveillance. How can privacy concerns be balanced with the benefits of enhanced security and crime prevention?

- **Environmental Impact**. Analyse the potential environmental impact of large-scale drone delivery services. What measures could be implemented to reduce any negative effects?

- **Interdisciplinary Integration**. How can drones be integrated into existing emergency response systems to improve efficiency and effectiveness?

- **Technological Advancements**. What are the limitations of drone technology in commercial applications, such as delivery services and agriculture?

- **Societal Impact**. Assess the societal implications of widespread drone usage in rural and remote areas. How can drones be leveraged to address challenges such as healthcare access, education, and infrastructure development?

CONCLUSION

29. Drones have emerged as a versatile tool with applications across various industries and sectors. From agriculture and construction to media and entertainment, drones are revolutionizing the way we work and live.

30. **Key Benefits of Drone Technology**.

(a) **Efficiency**. Drones can cover vast areas quickly and efficiently, saving time and resources.

(b) **Safety**. Drones can be used to inspect dangerous or inaccessible areas, reducing the risk to human life.

(c) **Data Collection**. Drones can collect high-resolution data, such as aerial photography and thermal imaging, to inform decision-making.

(d) **Precision**. Drones can perform tasks with precision, such as spraying crops or delivering packages.

31. As drone technology continues to advance, we can expect even more innovative applications and benefits in the years to come.

SUMMARY

- **Agriculture**. Farmers use drones for crop monitoring, spraying pesticides and analysing the field conditions. It is all about improving efficiency and yields.
- **Delivery Services**. Companies like Amazon are experimenting with drones for fast and efficient package delivery. Imagine getting your order in minutes.
- **Environmental Monitoring**. Drones help monitor wildlife, track deforestation and survey areas affected by natural disasters. They provide crucial data without disturbing the ecosystems.
- **Entertainment**. In filmmaking, drones enable breathtaking aerial shots that were once only possible with helicopters. They are also used in sports broadcasting and creating light shows.
- **Military**. Drones are used for reconnaissance, surveillance and targeted strikes. They have transformed modern warfare, but at the same time also raise ethical and legal questions.
- **Healthcare**. In remote areas, drones can deliver medical supplies, vaccines and even blood. They offer a lifeline where traditional transport cannot reach.

- **Infrastructure Inspection**. Drones are used to inspect bridges, power lines and pipelines. They can access hard to reach places and provide detailed images, ensuring timely maintenance and safety.

- **Personal Use**. Many people use drones for photography, racing and also as a hobby. It is a fun way to explore and capture the world from new angles.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. In which industry are drones used to monitor crop health and increase yields?

(a) Healthcare (b) Agriculture

(c) Entertainment (d) Military

Q2. Which company is known for experimenting with drone delivery services?

(a) Google (b) Microsoft

(c) Amazon (d) Apple

Q3. In environmental monitoring, what is one key use of drones?

(a) Delivering packages (b) Filming movies

(c) Tracking wildlife and deforestation (d) Racing

Q4. What type of drones are often used for reconnaissance and surveillance in the military?

(a) Delivery drones (b) Racing drones

(c) Surveillance drones (d) Filmmaking drones

Q5. Which industry uses drones for inspecting bridges, power lines, and pipelines?

(a) Agriculture (b) Healthcare

(c) Infrastructure inspection (d) Retail

Q6. Drones are used in filmmaking primarily for what purpose?

(a) Delivering scripts (b) Providing aerial shots

(c) Monitoring audience reactions (d) Transporting equipment

Q7. What kind of drones are used for entertainment purposes, like light shows and racing?

(a) Delivery drones (b) Agricultural drones

(c) Hobby drones (d) Military drones

Q8. In the healthcare industry, how are drones being utilized?

(a) Delivering medical supplies to remote areas

(b) Performing surgeries

(c) Monitoring patient health

(d) Administering vaccines directly

Q9. Which application involves drones performing tasks such as spraying pesticides and mapping fields?

(a) Retail (b) Agriculture

(c) Military (d) Entertainment

Q10. How are drones contributing to disaster response efforts?

(a) Delivering food

(b) Surveying damaged areas and aiding in search and rescue operations

(c) Recording news footage

(d) Providing internet access

Q11. Which type of drones are used to capture stunning aerial footage for movies?

(a) Delivery drones (b) Filmmaking drones

(c) Military drones (d) Agricultural drones

Q12. In logistics, what is a primary use of drones?

(a) Transporting employees (b) Delivering packages quickly and efficiently

(c) Monitoring warehouses (d) Managing inventory

Q13. Which sector uses drones to provide inspection of infrastructure like power lines and towers?

(a) Agriculture (b) Entertainment

(c) Infrastructure inspection (d) Military

Q14. What is a common use of drones in the environmental sector?

(a) Planting trees (b) Monitoring climate change effects

(c) Building habitats (d) Introducing new species

Q15. In what context are drones used to provide realtime surveillance and intelligence?

(a) Agriculture (b) Healthcare

(c) Military operations (d) Entertainment

Fill in the Blanks

Q1. Drones are used in_____ to monitor crop health and increase yields.

Q2. Companies like_____ are experimenting with drone delivery services.

Q3. In environmental monitoring, drones are used to track _____ and deforestation.

Q4. The _____ industry uses drones for providing stunning aerial shots in movies.

Q5. Drones used for surveying damaged areas and aiding in _____operations are crucial in disaster response.

Q6. In the healthcare industry, drones deliver _____ supplies to remote areas.

Q7. For infrastructure inspection, drones provide detailed images of _____, power lines and pipelines.

Q8. Drones used for personal _____ include photography and racing drones.

Q9. In logistics, drones are used to deliver _____ quickly and efficiently.

Q10. The _____ sector uses drones for real-time surveillance and intelligence.

DRONES

CHAPTER D IV: DRONE OPERATIONS

INTRODUCTION

1. Pre-flight activities are the duty of the Remote Pilot in Command(RPIC) before the start of the flight operation. Activities include inspection of the aircraft, assessment of the operating location, briefing crew members involved in the operation, and equipment checkouts.

TEACHING INSTRUCTIONS

Period	:	One (01)
Type	:	Lecture and Presentation
Year	:	2nd Year JD/JW
Conducting Officer	:	Officer/Trained PI/ AMI/ CGI
Training Aids	:	Class Room, Computer with OHP, Screen, Pointer Staff, Presentation, Script or Book Flagged or Lesson Plan in File, Board and Markers, and Models.

Time Plan

- Pre Flight Checks : 15 Min
- Start Up & Controls : 15 Min
- Emergencies : 10 Min

PREVIEW

The lecture will be conducted in the following parts:-

- **Part I : Pre-Flight Checks.**
- **Part II : Start Up & Controls.**
- **Part III: Emergencies.**

LEARNING OBJECTIVES

- **To know the pre-flight checks.**
- **To learn Start Up, Controls, and how it manoeuvers through the air.**
- **To know and understand the emergencies of the drone.**

PART I : START UP AND FLIGHT CONTROL

2. **Start-up Summary**.

(a) **Pre-Flight Checklist**.

(i) Ensure the battery is fully charged.

(ii) Inspect propellers and drone body for damage.

(iii) Update flight controller firmware.

(iv) Confirm remote controller functionality.

(b) **Powering Up**.

(i) Connect the battery to the drone.

(ii) Turn on the remote controller.

(iii) Power on the drone and wait for initialization.

(c) **GPS Lock**.

(i) Wait for the drone to acquire a GPS lock for stable flight.

3. **Flight Controls**.

(a) **Roll**.

(i) **Action**. Push the right stick to the left or right.

(ii) **Effect**. Rolls the drone, manoeuvering it left or right.

(b) **Pitch**.

(i) **Action**. Push the right stick forwards or backward.

(ii) **Effect**. Tilts the drone, manoeuvering it forwards or backward.

(c) **Yaw**.

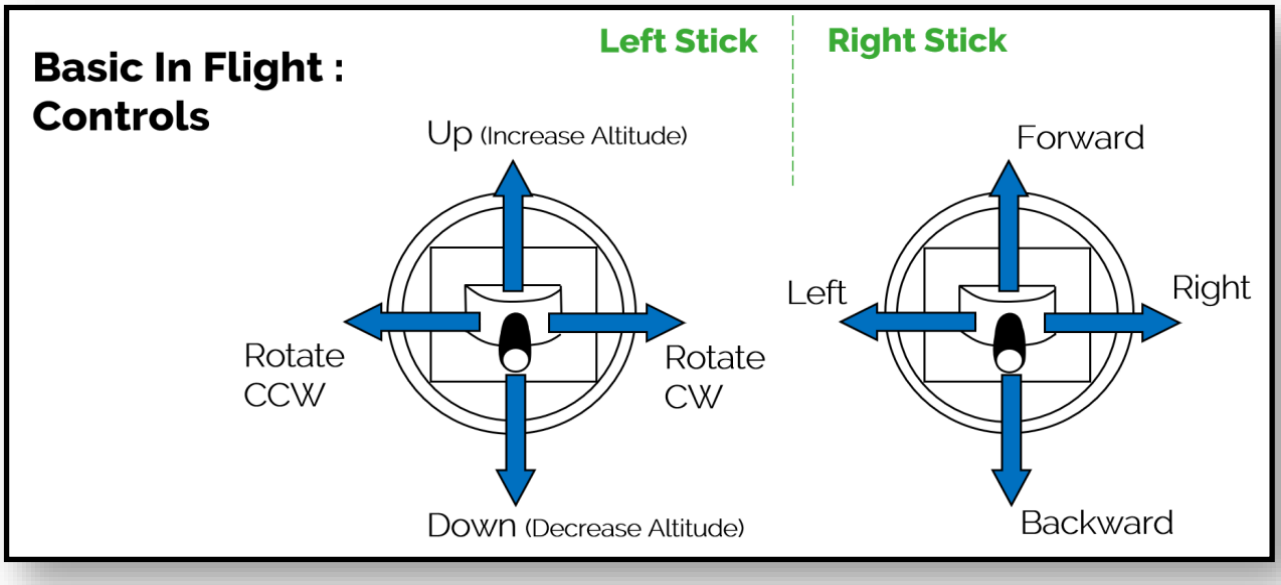
(i) **Action.** Push the left stick to the left or right.

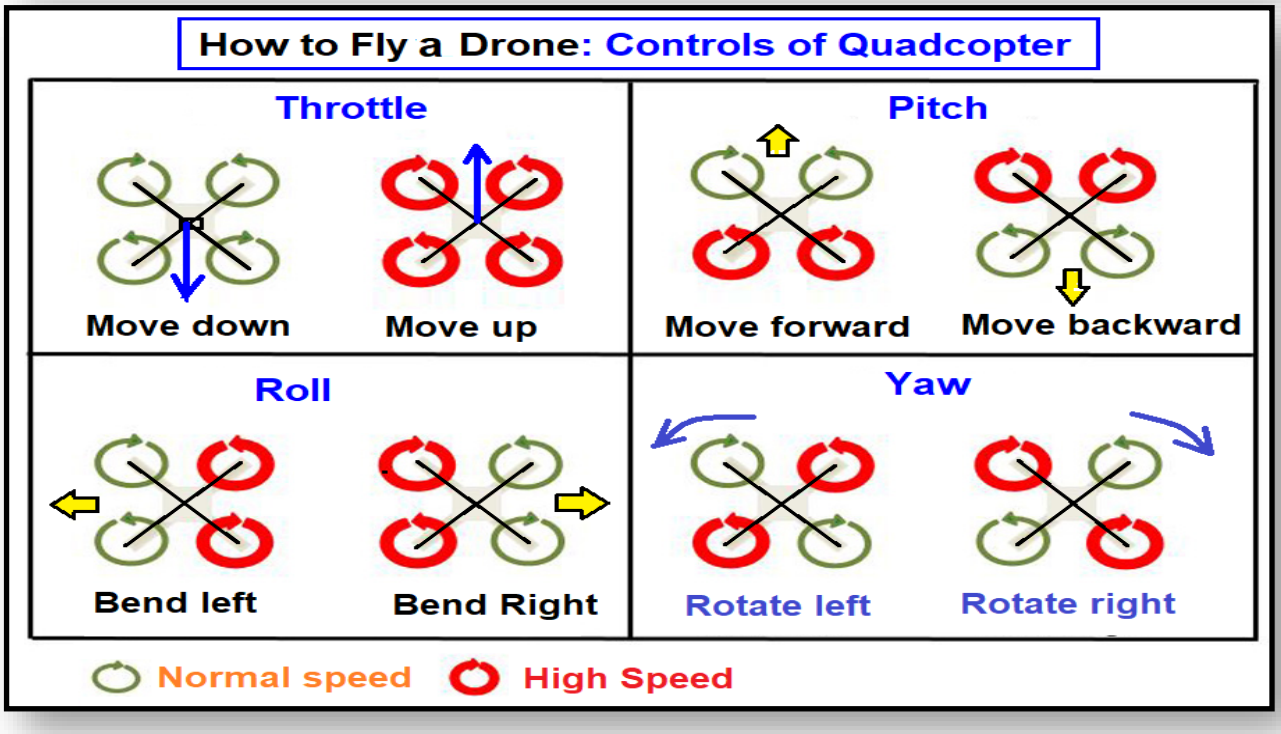
(ii) **Effect.** Rotates the drone left or right, changing the direction the front of the copter is pointing.

(d) **Throttle**.

(i) **Action.** Push the left stick forwards to increase, pull it backward to decrease.

(ii) **Effect.** Adjusts the altitude or height of the drone.





HIGHER ORDER THINKING SKILLS (HOTS)

- **Application**. How would you adjust the flight controls to hover a drone steadily in a strong wind? What steps would you take if your drone starts to lose GPS signal mid-flight?
- **Analysis**. Why might a drone experience instability when making sharp turns, and how can this be corrected using the flight controls?
- **Assessment**. Assess the pros and cons of using manual flight controls versus automated flight modes in various scenarios.
- **Imaginative Ability**. How would you navigate a drone through an obstacle course with varying altitudes and directions.

CONCLUSION

4. Pre-flight operations are crucial for ensuring the safety and success of drone flights. By following a comprehensive checklist and adhering to safety guidelines, pilots can mitigate risks and conduct safe and responsible operations.

5. **Key Pre-flight Considerations Include**.

(a) **Aircraft Inspection**. Thoroughly inspect the drone for any damage or anomalies.

(b) **Airspace Assessment**. Verify airspace regulations, identify potential hazards, and obtain necessary authorizations.

(c) **Battery and System Check**. Ensure batteries are fully charged and the drone's systems are functioning correctly.

(d) **Pilot Proficiency**. Ensure the pilot is adequately trained and familiar with the drone's controls and emergency procedures.

(e) **Weather Conditions**. Assess weather conditions and avoid flying in adverse weather.

6. By prioritizing safety and following established procedures, drone pilots can maximize the benefits of this technology while minimizing potential risks.

SUMMARY

- **Propellers**. Provide lift and thrust, essential for the drone's movement and stability.
- **Yaw Control**. Manages rotation around the vertical axis (left and right direction).
- **Pitch Control**. Adjusts rotation around the lateral axis (up and down movement).
- **Roll Control**. Controls rotation around the longitudinal axis (tilting left and right).
- **Throttle Control**. Increases or decreases the motor power to control altitude.
- **Radio Transmitter**. Transmits control signals from the remote controller to the drone.

ASSESSMENT EXERCISE

Multiple Choice Questions

Q1. Before a flight, what type of test should be conducted at low altitude?

(a) Emergency landing test (b) Battery drain test
(c) Preflight test flight (d) Weather resistance test

Q2. What should be assessed to ensure they are suitable for flying?

(a) Wind speed (b) Weather conditions
(c) Propeller condition (d) GPS signal

Q3. Which control is responsible for changing the altitude of a drone?

(a) Roll (b) Pitch
(c) Yaw (d) Throttle

Q4. Which control adjusts the drone's forward and backward movement?

(a) Roll (b) Pitch
(c) Yaw (d) Throttle

Q5. What does the yaw control effect on a drone?

(a) Altitude (b) Horizontal movement
(c) Rotation around the vertical axis (d) Speed

Q6. Which control would you use to make the drone move left or right?

(a) Roll (b) Pitch
(c) Yaw (d) Throttle

Q7. Combining which two controls allows the drone to fly in a diagonal direction?

(a) Throttle and yaw (b) Pitch and roll
(c) Roll and throttle (d) Pitch and Yaw

ANSWER KEY : MULTIPLE CHOICE QUESTIONS (MCQ)

ANSWER KEY TO MCQ : FD

Answer Key to MCQ : FD (Chapter - I)

Q1.	(a)	Q2.	(c)	Q3.	(a)	Q4.	(d)
Q5.	(d)	Q6.	(a)	Q7.	(a)	Q8.	(a)
Q9.	(c)	Q10.	(a)	Q11.	(a)	Q12.	(b)

Answer Key to MCQ : FD (Chapter - II)

Q1.	(b)	Q2.	(b)	Q3.	(b)	Q4	(b)
Q5.	(c)	Q6.	(d)	Q7.	(c)	Q8	(c)
Q9.	(b)	Q10.	(a)	Q11.	(a)	Q12	(a)
Q13.	(c)						

Answer Key to MCQ : FD (Chapter - III)

Q1.	(a)	Q2.	(a)	Q3.	(b)	Q4.	(b)
Q5.	(b)	Q6.	(c)	Q7.	(a)	Q8.	(a)
Q9.	(d)	Q10.	(c)	Q11.	(b)	Q12.	(d)
Q13.	(d)						

Answer Key to MCQ : FD (Chapter - IV)

Q1.	(c)	Q2.	(c)	Q3.	(d)	Q4.	(b)

Answer Key to MCQ : FD (Chapter - V)

Q1.	(a)	Q2.	(c)	Q3.	(b)	Q4.	(a)
Q5.	(b)	Q6.	(d)	Q7.	(a)	Q8.	(a)

Answer Key to MCQ : FD (Chapter - VI)

Q1.	(a)	Q2.	(a)	Q3.	(a)	Q4.	(a)
Q5.	(a)	Q6.	(a)	Q7.	(a)	Q8.	(d)
Q9.	(a)	Q10.	(d)				

Answer Key to MCQ : FD (Chapter - VII)

Q1.	(a)	Q2.	(a)	Q3.	(b)	Q4.	(b)
Q5.	(b)	Q6.	(c)	Q7.	(b)	Q8.	(b)
Q9.	(a)	Q10.	(a)				

Answer Key to MCQ : FD (Chapter - VIII)

Q1.	(a)	Q2.	(a)	Q3.	(a)	Q4.	(a)
Q5.	(b)	Q6.	(a)	Q7.	(b)	Q8.	(b)
Q9.	(a)	Q10.	(b)				

Answer Key to MCQ : FD (Chapter - IX)

Q1.	(d)	Q2.	(c)	Q3.	(a)	Q4.	(d)
Q5.	(a)	Q6.	(d)	Q7.	(c)	Q8.	(c)
Q9.	(a)						

ANSWER KEY TO MCQ : WT

Answer Key to MCQ : WT (Chapter - I)

Q1.	(a)	Q2	(b)	Q3	(b)	Q4	(c)
Q5.	(a)	Q6	(c)	Q7	(a)	Q8	(d)
Q9.	(b)	Q10	(a)	Q 11	(a)	Q12	(b)
Q13.	(c)	Q 14	(c)	Q 15	(c)		

Answer Key to MCQ : WT (Chapter - II)

Q1.	(d)	Q2.	(c)	Q3	(a)	Q4	(b)
Q5.	(c)	Q6.	(d)	Q7	(b)	Q8	(c)
Q9.	(b)	Q10.	(d)	Q11	(c)	Q12	(c)
Q13.	(b)	Q14.	(a)	Q15	(c)		

Answer Key to MCQ : WT (Chapter - III)

Q1.	(a)	Q2.	(b)	Q3.	(a)	Q4.	(b)
Q5.	(b)	Q6.	(a)	Q7.	(c)	Q8.	(a)
Q9.	(b)	Q10.	(a)	Q11.	(a)	Q12.	(d)
Q13.	(a)	Q14.	(a)	Q15.	(b)		

Answer Key to MCQ : WT (Chapter - IV)

Q1.	(b)	Q2.	(a)	Q3.	(c)	Q4.	(a)
Q5.	(d)	Q6.	(a)	Q7.	(d)	Q8.	(c)
Q9.	(d)	Q10.	(b)	Q11.	(b)	Q12.	(c)
Q13.	(a)	Q14.	(a)	Q15.	(b)		

Answer Key to MCQ : WT (Chapter - V)

Q1.	(b)	Q2.	(b)	Q3.	(a)	Q4.	(d)
Q5.	(b)	Q6.	(b)	Q7.	(b)	Q8.	(b)
Q9.	(c)	Q10.	(c)	Q11.	(c)	Q12.	(d)
Q13.	(a)	Q14.	(a)	Q15.	(a)		

ANSWER KEY TO MCQ : OT

Answer Key to MCQ : OT (Chapter - I)

Q1.	(c)	Q2.	(b)	Q3.	(d)	Q4.	(d)
Q5.	(c)	Q6.	(d)	Q7.	(b)	Q8.	(c)
Q9.	(b)	Q10.	(c)	Q11.	(a)	Q12.	(b)
Q13.	(c)	Q14.	(b)	Q15.	(c)	Q16.	(a)
Q17.	(c)	Q18.	(c)	Q19.	(c)	Q20.	(b)

ANSWER KEY TO MCQ : DRONE

Answer Key to MCQ : D (Chapter - I)

Q1.	(c)	Q2.	(b)	Q3.	(c)	Q4.	(b)
Q5.	(c)	Q6.	(b)	Q7.	(b)	Q8.	(c)
Q9.	(c)	Q10.	(a)	Q11.	(b)	Q12.	(c)
Q13.	(c)	Q14.	(b)	Q15.	(c)		

Fill in the Blanks

Q1.	Digital Sky Platform	Q2.	Aircraft	Q3.	Exempt
Q4.	Digital Sky Platform	Q5.	India		

Answer Key to MCQ : D (Chapter - II)

Q1.	(c)	Q2.	(c)	Q3.	(c)	Q4.	(c)
Q5.	(c)	Q6.	(b)	Q7.	(c)	Q8.	(b)
Q9.	(b)	Q10.	(d)	Q11.	(c)	Q12.	(b)
Q13.	(b)	Q14.	(b)	Q15.	(b)		

True or Flase

Q1.	True	Q2.	False	Q3.	True	Q4.	False
Q5.	False	Q6.	True	Q7.	False	Q8.	True
Q9.	False	Q10.	True	Q11.	True	Q12.	True
Q13.	False	Q14.	True	Q15.	False		

Answer Key to MCQ : D (Chapter - III)

Q1.	(b)	Q2.	(c)	Q3.	(c)	Q4.	(c)
Q5.	(c)	Q6.	(b)	Q7.	(c)	Q8.	(a)
Q9.	(b)	Q10.	(b)	Q11.	(b)	Q12.	(b)
Q13.	(c)	Q14.	(b)	Q15.	(c)		

Fill in the Blanks

Q1.	Agriculture	Q2.	Amazon	Q3.	Wildlife
Q4.	Film making	Q5.	Search & Rescue	Q6.	Medical
Q7.	Bridges	Q8.	Hobbies	Q9.	Packages
Q10.	Military				

Answer Key to MCQ : D (Chapter - IV)

Q1.	(c)	Q2.	(b)	Q3.	(d)	Q4.	(b)
Q5.	(c)	Q6.	(a)	Q7.	(b)		

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