SER No	CONTENT
(a)	**LESSON PLAN : MR 4** **RELIEF, CONTOURS AND GRADIENTS** Period - Two/One Type - Lecture/Practice Code - MR 4 Term - I&II --- **Training Aids** 1. Map Sheets,Computer Slides, Pointer, Charts, Black board & Chalk. **Time Plan** 2. (a) Introduction - 05 Min (b) Relief, slopes - 15 Min (c) Countours and Gradients - 15 Min (d) Conclusion - 05 Min (e) Practice - 40Min **AIM** 3. The aim of this lecture is to introduce the Cadets to Relief ,slopes Countours and gradients in map reading. **PREVIEW** 4. The lecture will be conducted in the following parts:- (a) Part I - Relief and Slopes (b) Part II - Countours and Gradients **PART I : RELIEF AND SLOPES** **Relief** 5. Relief is a general term applied to the shape of the ground in a vertical plane. Representation of a relief on a map means showing of heights and shape of the ground above or

below or datum which is normally sea level. Thus it shows the broad features and reletive heights of highlands and low lands which are potrayed on the map.

6. Relief is shown with means of hachures, shading, form lines, layer tints, contours, spot heights, trig heights, bench marks and relative heights.

Slopes

7. The closer together the contour lines are, the steeper is íhe slope of the hill which they show, where they are far apart, the slope down is gradual. Remembering this, it is possible to see at a glancé where the steeper hills are.

Type of Slopes

8. There are two type of slopes, convex and concave. A convex slope is the one which bulges outwards and concave slope is the one which curves inwards.

(b) **PART II :COUNTOURS AND GRADIENTS**

Contours

9. A contour is an imaginary line following surface of the ground at a certain level. If you walk around a hill at a certain level, going nither uphill nor down, you will be following the countour for that level.

10. **Characteristics of Contours.** These are as under:-

(a) Contours accurately show the height, the shape and slope of the ground.

(b) Contours are shown generally in brown and rarely in black.

(c) Height is marked on every fifth contour on 1:50000 scale map.

(d) Contour lines vary in appearance.

(e) These line never touch or cross each other except at hanging cliff where they appear dotted.

Vertical Interval (VI)

11. The rise between successive contour lines is known as the verticai interval. On map scale 1 inch to 1 mile, the VI of each contour line is 50 feet while on the 1/4 inch to a mile it is 250 feet.

Horizontal Equivalent (HE)

12. The distance measured flat on the map between adjacent contour lines is horizontal equivalent (HE).

Gradient

13. The slope of the ground may be expressed as the angle the ground makes with the horizontal but more commonly it is expressed as a gradient – 1 in 15 or 1 in 20, which may be written as 1/15 or 1/20. A gradient of 1 in 15 means that in a horizontal distance of 15 m the ground rises or falls 1 metre so the gradient of the slope is the relation that its rise or fall bears to its length measured on the ground or in other words it is the ratio of the vertical interval to horizontal equivalent. It is independent of any unit of measurement. Simple Formula is VI/HE = Gradient.

14. The horizontal equivalent is obtained by measuring on the map and vertical interval by subtracting the contour heights.

15. You may often need to know just how steep a piece of ground is, whether a road is too steep for a certain type of vehicle to negotiate. The gradient can be worked out quickly from a contoured map.

16. **Measuring Gradient.** The rise or fall of a slope can be expressed in following two ways:-

(a) In a Angle or Degree of Slope.

(b) The tangent of the Angle or Gradient.