

#### UNIT IV – LEVELLING AND APPLICATIONS

##### 1. Define Cross-Sectioning and its applications.

- ✓ Cross-Sectioning is defined as the process of determining the lateral outline of the ground while levelling the sections right angles to the centre line.
- ✓ The length of the cross-sections from the centerline depends on the ground features and the nature of the project.
- ✓ For the Highway Project, the length varies from 30 m to 60 m on either sides of the centerline. For the railway project, the length varies from 200 m to 300 m.

##### 2. Define Contour. (Nov/Dec 2010) (Nov/Dec 2007) (Nov/Dec 2006)

- Contour is defined as the imaginary line, joining the points of equal elevation (RLs). It is a line of intersection of a level surface with the ground. Generally, Contour lines are marked with their elevations from the datum. The map representing the contour lines is called Contour Map.

##### 3. Define the term Contouring. (Nov/Dec 2009)

- Contouring is defined as the process of locating the contour lines on the surface of the earth.

##### 4. Sketch the contours of the following:

- a) Hill b) Pond c) A ridge line d) A valley line (Apr/May 2005)



Fig. (A) A Hill or a Mound

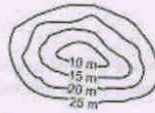


Fig. (B) A Pond

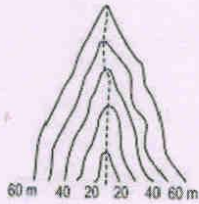


Fig. (C) A Valley

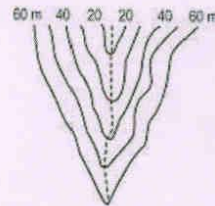


Fig. (D) A Ridge Line

##### 5. What do you mean by contour interval? (Apr/May 2011) (Nov/Dec 2012) (Nov/Dec 2005)

- ❖ Contour interval is defined as the vertical distance between any two consecutive contours. It is a constant for a map.

##### 6. Define the term Contour Gradient. (May/June 2012)

- ❖ The imaginary line, throughout the surface of the earth having a constant inclination to the horizontal is called contour gradient.

##### 7. What is horizontal equivalent? Why it is not a constant? (Nov/Dec 2010)

- ✓ Horizontal equivalent is defined as the horizontal distance between the two consecutive contour lines. It is not a constant for a map. If the H.E. is small, it indicates the steeper slope. H.E. depends on the slope of the ground.

##### 8. What are the methods of the indirect contouring method?

Following three methods are generally followed in the indirect contouring method.

1. By Squares
2. By cross-sections
3. By tacheometric method

**9. What are the uses of Contours?****(May/June 2006)**

1. To identify the topography of the place, whether the ground is flat, undulating or mountainous.
2. To finalize the most suitable and most economical sites for engineering projects such as roads, railways, reservoirs, canals, sewers etc.
3. To determine the catchment area of the drainage basin and the capacity of the reservoir.
4. To calculate the earth work for engineering projects.
5. To ascertain the intervisibility of points.
6. To identify the contour gradient for road alignment.
7. To draw the L.S and C.S to ascertain the nature of the ground.
8. To decide the intervisible and invisible points, positions of Gunman, etc., in the military field.

**10. Define Mass diagram (or Mass-Haul Diagram)**

- ❖ Mass diagram (or Mass-Haul Diagram) is defined as the curve plotted based on distance, used to calculate the volume of cutting and filling of earth work for a project. The ordinate at any point represents the algebraic sum of cuttings and fillings, from the starting point of the earthwork to that point, considering the cuttings are taken as positive and filling are taken as negative.

**11. State the limitations of Prismoidal Formula.****(Apr/May 2010)**

- ❖ Prismoidal Formula is only applicable when the number of areas (or ordinates) are odd.

**12. Write down the Prismoidal formula for finding out the volume using a contour map. (May/June 2007) (Nov/Dec 2007)**

$$\text{Volume, } V = \frac{h}{3} (A_1 + A_n) + 2(A_2 + A_5 + \dots) + 4(A_3 + A_4 + \dots)$$

**Where,** **$h$  - Contour interval (in m)** **$A_1, A_2, A_3 \dots$  - Area covered by a contour elevation (in  $m^2$ )**