

August 2021

MINE SURVEYING – III*Time Allowed: 1.5 Hours**Full Marks: 70***Answer to Question No. 1 is compulsory and Answer any two questions from the rest.**

1. Answer the following questions (any twenty): 2x20
- i. A 2 degree curve of chord length 20 m has a radius of-
a) 573m b) 286.5m c) 143m d) 72.5m
 - ii. The length of the long chord of a simple circular curve having 150 m radius and 60° deflection angle is-
a) 180 m b) 160 m c) 150 m d) 200 m
 - iii. A transition curve is a curve of -
a) Fixed radius b) varying radius c) both of varying and fixed radius d) none of these
 - iv. In the case of vertical curve, a 3% gradient means that the ground rises-
a) 1m for every 3m b) 3m for every 100m c) 0.3m for every 300m d) 0.1m for every 3m
 - v. The maximum inclination of a bed or seam from the horizontal is known as-
a) Apparent dip b) full dip c) strike d) none of these
 - vi. Tunnel Survey requires the establishment of-
a) Horizontal Control Points
b) Vertical Control Points
c) Both Horizontal and Vertical Points
d) None of these
 - vii. The angle between the vertical and the fault plane is known as-
a) Want b) Throw c) Hade d) none of these
 - viii. Angle subtended at the centre by an arc of specified length is known as ----- of curve.
 - ix. The shape of the vertical curve is generally -----.
 - x. The maximum value of the centrifugal ratio for roadway is -----.
 - xi. Length of curve having 250 m radius and 60° deflection angle is -----.
 - xii. The most accurate method of setting out circular curve by linear measurement is known as ----- method.
 - xiii. The super elevation can be expressed by the formula -----.
 - xiv. Vertical curve can be classified as summit curve and ----- curve.
 - xv. The gradient of vertical curve can be expressed as ----- and -----.
 - xvi. The inclination of a seam from the horizontal in any direction other than perpendicular to the strike line is known as ----- of the seam.
 - xvii. If full dip of a seam is 45° in $N30^{\circ}E$ then apparent dip in $N70^{\circ}E$ is -----.

- xviii. True or stratigraphical thickness of a seam is measured at ----- angles to the dip of the seam.
- xix. The tunnel may be straight or -----.
- xx. The difficulty in horizontal connection through suspended wires may be solved by ----- triangle.
- xxi. The fracture against which the rocks are relatively displaced is known as -----.
- xxii. The angle between the vertical and the fault plane is known as want. (True / False)
- xxiii. The maximum value of the centrifugal ratio for railway is 1/6. (True / False)
- xxiv. The amount of vertical displacement of the bed is known as throw. (True / False)
- xxv. The strike line and direction of full dip are always perpendicular to each other. (True / False)
2. Explain all elements of circular curve with neat diagrams. (15)
3. Derive formula for setting out simple circular curve by the offsets from the long chord method. Explain briefly the procedure also. (15)
4. Explain the requirements of a transition curve. Derive formula for super elevation on the outer edge of curved path. (15)
5. A curve of radius 150 m has a deflection angle of 60° . It has to be set with deflection angles from the backward tangent point (Rankine's method). Tabulates all tangential and deflection angles for locating points on the curve at 20m peg intervals. The chainage of the vertex is 1008.65m. (15)
6. What are the purposes of a vertical curve? Explain different types of vertical curves based on the gradients with neat sketches. (15)
7. What do you mean by full (true) dip and apparent dip of a seam? Establish relationship between true dip and apparent dip. (7+8)
8. The following observations were made in two roads AB and AC in a seam:-
- | ROAD | BEARING | INCLINATION |
|------|--------------------|----------------|
| AB | N $27^\circ 30'$ W | Dipping 1 in 7 |
| AC | S $85^\circ 36'$ W | Dipping 1 in 9 |
- Calculate the direction and rate of full dip of the seam. (15)
9. Two seams of coal are 50 metres vertically apart and dip as 1 in 5. Calculate the length of a cross measure drift driven to connect them if it dips 1 in 3 in the same directions as the seams. What would be its length if it rises 1 in 10 towards the dip of the seam? (15)
10. a) Explain vertical thickness or apparent thickness of seam and true or stratigraphical thickness of seam in brief.
 b) A vertical borehole passes through a seam of coal which is known to dip at 50° . If the apparent thickness of the seam as ascertained from the core is 9.6 metres. What is true or stratigraphical thickness of the seam? (7+8)
11. Explain different types of tunnels in brief. Describe the operations involved in tunnel surveying. (15)
12. Describe any one method of transferring surface alignment to underground through vertical shaft. (15)