NAME : Shah Sawar Khan

ID : 7712

SECTION : A

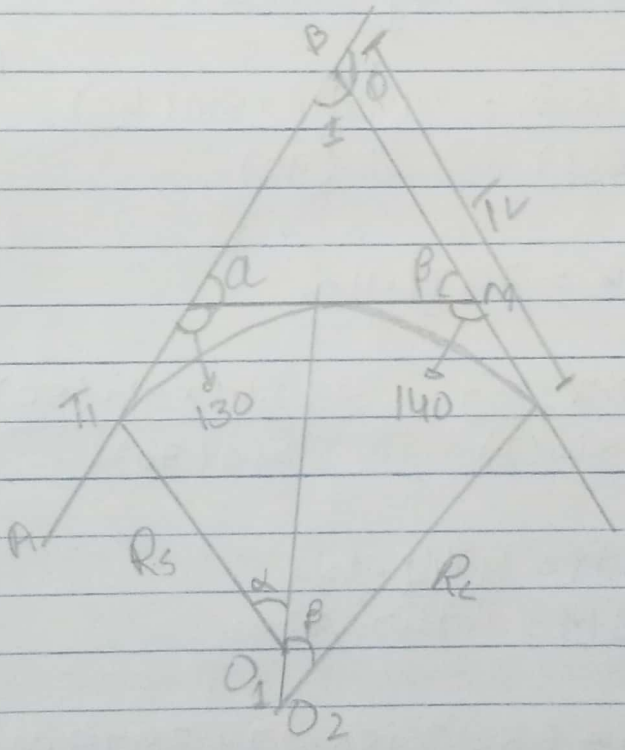
Submitted To : Engr: Abdul Rarhan

Date : 28-Sept-2020

Day: M T W T F S Date: __/__/__

Q#01 Given Data:

Angle AKM = 130°
Angle KMC = 140°
Radius of 1st Arc = 7712 - 300 = 7412 m
Radius of 2nd Arc = 7712 - 200 = 7512 m
Intersection point = 7712 - 400 = 7312 m



Sol:

$\alpha = 180° - 130° = 50°$
$\beta = 180° - 140° = 40°$
$\phi = \alpha + \beta = 50 + 40 = 90°$
$I = 180° - 90° = 90°$
$KT_1 = KN = R \tan(\alpha/2) = 7412 \tan\left(\frac{50}{2}\right)$
$KT_1 = 3456.27\ m$

$MN = MI_2 = R_L \tan(B/2) = 7512 \tan(\frac{40}{2})$

$MN = 2734.14\,m$

$KM = KN + MN = 3456.27 + 2734.14$

$KM = 6190.41\,m$

Find BK & BM by Sine Rule.

$BK = \frac{MK \sin B}{\sin(I)} = \frac{6190.41 \times \sin(40)}{\sin(90)}$

$BK = 3979.11\,m$

$BM = \frac{MK \sin\alpha}{\sin(I)} = \frac{6190.41 \times \sin(50)}{\sin(90)}$

$BM = 4749.12$

$BM = 4742.12\,m$

$T_L = kT_1 + BK = 3456.27 + 3979.11$

$T_L = 7435.38\,m$

$T_S = MT_2 + BM = 2734.14 + 4742.12$

$T_S = 7476.26\,m$

$$L_L = \frac{\pi R_L \alpha}{180^\circ} = \frac{3.14 \times 7412 \times 50}{180}$$

$$L_L = 6464.91\,m$$

$$L_S = \frac{\pi R_S \beta}{180} = \frac{3.14 \times 7512 \times 40}{180}$$

$$L_S = 5241.70\,m$$

As we have intersection point is 7312m

Now $P.I - T_L = 7312 - 7435.38$

$= -123.38\,m$

Chainage of $T_1 = 7188.62\,m$

Chainage of $T_1 + L = 7188.62 + 6464.91$

$= 13653.53\,m$

Now Chainage of Compound Curve (CC) + L_S

$= 13653.5m + 5241.70$

$= 18895.23\,m$

Chainage of $T_2 = 18895.23m$

Q#2 What is transition Curve?

Part [A]

Ans: A Curve of varying radius is called transition curve. It is also called Spiral Curve or Easment Curve.

It is used on both highway & railway b/w tangent & a circular curve in order to have a smooth transition from tangent to the curve in order to have a smooth transition from tangent to the curve to the tangent

It is also inserted b/w two branches of Compound curve.

How Super Elevation is Effected.

when vehicle moves from tangent on to the curve the forces acting on it are . Weight of the vehicle

- Centrifugal force, Both acting Through the Centre of gravity of the vehicle

The effect of centrifugal force is to push the vehicle off the rail or road

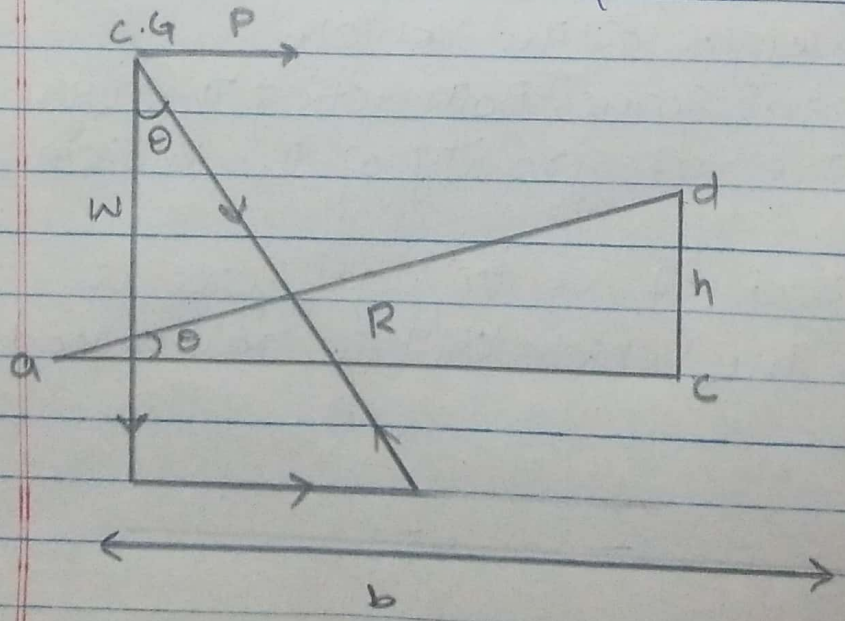
To counter act the action the outer rail or outer edge of the road is raised above the raising outer edge of rail or road above the inner one is called Super elevation or Cant

The amount of Super elevation depends upon

- Speed of the vehicle
- Radius of the vehicle

Prove with the help of Equation

Let W = weight of vehicle
P = centrifugal force
V = Speed of vehicle, m/s
g = acceleration to gravity m/s^2
R = radius of curve, m
h = Super elevation, m
b = width of the road = m



For equilibrium the resultant R of the P & W must be equal & opposite to the reaction perpendicular to road or rail surface

$$P = \frac{mv^2}{R} = \frac{Wv^2}{gR} \quad \because W = mg$$

$$\frac{P}{W} = \frac{v^2}{gR}$$

$$\tan\theta = \frac{h}{b} = \frac{dc}{ac} = \frac{P}{W}$$

$$\tan\theta = \frac{h}{b} = \frac{P}{W} = \frac{v^2}{gR}$$

$$h = b\tan\theta$$

$$h = b\frac{v^2}{gR} \longrightarrow \text{on highway}$$

$$h = b\frac{Gv^2}{gR} \longrightarrow \text{on railway}$$

where G = distance b/w the centre of the rail

Super elevation is gradually applied along a transition curve Full super elevation is attained at junction of the transition curve with the circular curve.

BY: MTWTFS Date: __/__/__

Q#03

Part "A" What is the difference b/w triangulation & Trilateration?

Ans:

	Triangulation	Trilateration
1	All angles are measured in triangulation	① All sides are measured in trilateration
2	Distance of base line is measured	② Azimuth of the initial line is measured
3	Inter-visibility b/w Stations is essential	③ For Small areas it is possible to measure distance without intervisibility
4	Some check base line are also measured to control Scale error	④ Some check angles are measured to control azimuth error
5	There are more internal checks in Comparison with trilateration in the Same geomatric figure	⑤ There are less internal checks in Comparison with triangulation in the Same geomatric figure.
6	The Side lengths are Computed on the basis of measured angles applying Sine law	⑥ The angles are Computed on the basis of measured Side lengths applying Cosine law.

(Q#3

Part B Explain the principles of triangulation & trilateration?

Ans

Principle of triangulation:

If all the three angles and the length of one side of a triangle are known, then by trigonometry the length of the remaining sides of the triangle can be calculated.

2 Again, if the coordinates of any vertex of the triangle and azimuth of any side are also known, then coordinates of the remaining vertice may be computed.

Sine Rule:

$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(c)} \quad \text{(for finding sides)}$$

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{b} = \frac{\sin(C)}{c} \quad \text{(for finding Angles)}$$

Principle of trilateration:

1. Trilateration is a highly accurate and Precise method of establishing and expanding horizontal control.
2. Method of control Survey in which a network of triangles is used as in triangulation System
3. All the three sides of each triangle are measured in the field with the distance measuring instrument (EDMs, tapes, etc)
4. Horizontal angles are not measured in the field
5. Angles in the trilateration System are Computed indirectly from the lengths of the sides of triangle by cosine formula
6. Few horizontal angles are also sometimes measured to provide a check on Computed angles
7. trilateration is adjusted after the Computation of the angles and then Co-ordinates of the System are determined
8. verticle angle are also measured where elevations have not been established.

Cosine Rule:

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$2bc\cos A = b^2 + c^2 - a^2$$

$$\cos A = b^2 + c^2 - a^2 / 2bc$$

$$A = \cos^{-1}\left[\frac{b^2 + c^2 - a^2}{2bc}\right]$$

Q#04 Part[A] What is hydrographic Survey? Why we do it. and what are the factors to be determined while conducting hydrographic survey?

Ans: Hydrographic Survey:

It is the branch of Surveying which deals with water bodies e.g: lake, river etc

The usual fundamental principles of Surveying and levelling are adopted for aquiring data for determination of

1 Water volume
2 Rate of flow
3 To determine the shape of the area underlying the water surface etc.

Why we do-it?

Ans: To determine the quantities of Subaqueous excavations
2 Measure areas Subjected to Scouring or silting in harbours or docks
3 Locate rocks and other objects such as buoys, Light etc to aid Safe navigation
4 To prepare navigation Charts exibiting the depths available for navigation
5 Control floods, and to plan water Supply & Storage from rivers
6 To develop water resources for power irrigation and recreation

Q#04

Part[A] Factor of Hydrographic Survey

Ans To measurement of depth of water at various points is termed as Sounding

2 Depth of Sounding is referred to the water level at the time it is made

3 There after, the Soundings are reduced to datum water level, to account for tidal water which undergo continual change of elevation, with the help of gauges

4 A number of benchmarks [B.M] are established at frequent intervals along Shore lines, and gauges are set on them

5 The field work Consist of both horizontal as well as vertical Control

6 The horizontal control is established by traversing or triangulation

7 For verticle control, the tide gauge are kept in operation Continuously since the water level at that gauge must also be known when Sounding are recorded.

Q#04 Part [B] What is Sounding & Purpose of Sounding Also name the equipments used to determine Sounding?

Ans: **Sounding:**

The Process of determing depth below water Surface is called Sounding Sounding is analogous to levelling on land To reduce level of any point on the bottom of a water body is obtained by Subtracting the Sounding from the mean Sea level.

Purpose of Sounding:

1. Preparation of accurate Charts for navigation
2. Determination of the quantities of the materials to be filled
3. Obtaining information for design of breakwaters, sea walls etc.

Equipments:

The following are the equipments used to determine Sounding

1- Shore Signals and buoys
2- Sounding equipment
3- Angle measuring instrument

Day: M T W T F S Date: __/__/__

Q#05
Part [A] What is aerial photogrammetry and why we do it?

Ans: Aerial Photogrammetry:

Aerial photogrammtry involve the use of photograph taken in a systematic manner from the air. They are then controlled by land survey & measure by photographic techniques Since the 1st world user the terrestrial Photographic Surveying has been replaced by aerial photographic Surveying due to the development of the aeroplane

Why we do it?

Ans
The Survey work can be carried out with great Speed.
2 It can be used with great Sucess for other purposes i-e Classification of land or Soil, geological or archeological investigation etc
3 Aeriel Survey is highly technical & Specialized work & must be carried out stilled trained & experience person
4 It is mainly made by government organization e.g. Survey of Pakistan Department

Q# 05 Part [B] Shortly Explain Procedures of aerial Photography?

Ans: Verify that the weather condition are suitable for flying under condition of low visibility or potential Strong turbulence should be avoided. Bad weather condition could not only produce unacceptable photographic results but also risk the flying crew Mount the aerial camera according to established procedure. test the Camera to ensure that it is functioned properly. Fly the designed routes and take the photographs according to plans. Process the film according to Specifications to ensure radiometrically and geometrically quality image If necessary, print on the negatives the missing photo information such as Serial number, date, project info etc prepare Contact prints from the negative. If necessary, prepare enlargments to be used lator according to project requirements. Select photographs that will be used for data Compilation and develop dipositive for them.