

KADI SARVA VISHWAVIDYALAYA
B.E. SEMESTER-III EXAMINATION DECMBER-2016

Subject Code:CV-306
Date: 30/12/2016

TIME: 10:30 a.m. To 1:30 p.m.

Subject Name: Surveying
Total marks: 70

Instruction:

1. Answer each section in separate Answer Sheet.
 2. Use of scientific calculator is permitted.
 3. All questions are compulsory.
 4. Indicate **clearly** the options you attempted along with its respective question number.
 5. Use the last page of supplementary for rough work.

Section-I

- Q.1** (A) Define following terms for the Vernier transit theodolite: [05]
 (1) Plunging (2) Swinging (3) Face right observation
 (4) Line of Collimation (5) Latitude.

(B) Define theodolite traversing. Enlist different methods of theodolite traversing and explain any one. [05]

(C) In a traverse survey, the length and bearing of last line DA were not recorded; Find the missing data of line DA. [05]

Line	Length (m)	Bearing
AB	175.50	$30^{\circ} 24'$
BC	170.00	$109^{\circ} 36'$
CD	160.25	$211^{\circ} 30'$
DA	(?)	(?)

OR

- Q.2**

(C) Explain the procedure of Radiation Method of plane table surveying. [05]

(A) Enlist various instruments used in plane table survey and briefly explain any two of them with sketch. [05]

(B) The following are the length and bearings of the lines of a closed traverse ABCDA. Find out closing error and its direction. [05]

Line	Length(m)	Bearing
AB	235.10	338°20'
BC	317.40	82°22'
CD	215.00	167°00'
DA	281.60	259°40'

OR

- Q.2** (A) Draw neat sketch of simple circular curve and explain elements of these curves. [05]
(B) Explain Rankine's method of tangential angle for setting out simple circular curve. [05]

Q.3 (A) Enlist various methods of setting out simple circular curve and explain any one. [05]

- (B) The following are the values of offsets taken from a chain line to an irregular boundary. [05]
 Calculate the area included between chain line & irregular boundary by Simpson's rule.

Distance (m)	0	5	10	15	20	30	40	60	80
Offset(m)	2.40	3.70	4.50	5.30	6.00	4.80	5.70	3.80	2.10

OR

- Q.3** (A) Write short note on Reverse curve with figure. [05]
 (B) The latitude and departures of the lies of a closed traverse ABCD are given below. [05]
 Calculate the area of the traverse by Coordinate method.

Line	Latitude(m)	Departure (m)
AB	-164.5	162.1
BC	217.8	59.8
CD	168.1	-105.6
DA	-221.4	-116.3

Section-II

- Q.4** (A) Define the following terms. [05]
(1) Tangent distance (2) Long chord (3) Deflection Angle
(4) Apex distance (5) Mid-ordinate

(B) A canal is running in cutting, bed width of canal is 10m and side slope 1:1, if depths of cutting of canal at 30 m intervals are 1.1, 1.3, 1.4, 1.35, 1.45, 1.6, 1.9, 1.8, and 2.1. Calculate volume of cutting by prismoidal formula. [05]

(C) What do you understand by hydrographic surveying? What are the main purposes for hydrographic surveying are carried out? [05]

OR

- Q.5**

 - (C) Discuss horizontal and vertical control in setting out of works. [05]
 - (A) What is sounding in hydrographic survey? Enlist the equipments used for soundings. Briefly explain working of any one of them with sketch. [05]
 - (B) Explain the basic procedure, instruments and materials required to set out the foundation of a building on the ground as per the plan. [05]

OR

- Q.5** (A) Write short note on Sounding rods or poles. [05]
(B) Derive equation for Simpson's rule to find out area of an irregular boundary. [05]

Q.6 (A) Explain Co-ordinate System in G.I.S [05]
(B) Write short note G.I.S [05]

OP

- Q.6** (A) Discuss applications of G.I.S in different Engineering field. [05]
(B) Define departure. Differentiate between the consecutive and Independent coordinates [05]

KADI SARVA VISHWAVIDYALAYA

B.E. (Civil) Semester-III Examination, April'2015

Subject Code-CV-306

Date: 18/04/2015

Time: 10:30 am to 1:30 pm

Subject: Surveying

Total Marks: 70

Instructions:

- (1) Answer each section in separate answer sheet
- (2) Use of scientific calculator is permitted
- (3) All questions are Compulsory
- (4) Indicate **Clearly**, the options you attempt along with its respective questions number.
- (5) Use the last page of main supplementary for **rough work**

Section-I

Q-1 (All Compulsory)

- (A) "Theodolite is Universal Instrument" –Justify Statement [5]
- (B) The following records are obtained in a closed traverse PQRS, the lengths of the lines SP could not be measured due to an obstruction. Determine the lengths from the following data. [5]

Line	Length(m)	Bearing
PQ	75.50	30° 24'
QR	180.50	110° 36'
RS	60.25	210° 30'
SP	(?)	(?)

- (C) Define following terms for the Vernier transit theodolite: [5]
(1) Plunging (2) Face right (3) Latitude. (4) Axis of bubble tube (5) Centering

OR

- (C) Explain the temporary adjustment of Theodolite in brief. [5]

Q-2 Answer the following Questions

- (A) Enlist instruments used in plane table survey & explain any two of them with sketch. [5]
- (B) The following data were obtained for a closed traverse ABCDEA which was run in the clockwise direction. Compute corrected consecutive co-ordinates using. Use any one rule for balancing of the traverse. [5]

Line	Length(m)	Latitude	Departure
AB	70.00	+21.500	-65.450
BC	80.00	-80.755	-5.250
CD	43.00	-41.000	+13.550
DE	38.00	-14.250	+35.150
EA	115.00	+114.150	+22.315

OR

- (A) Discuss Instrumental error, Personal error, Natural error in Theodolite Survey [5]
(B) What are the advantages and disadvantages of plane table survey [5]

Q-3 Answer the following Questions

- (A) What do you understand by hydrographic surveying? What are the main purposes for which hydrographic surveying are carried out. [5]
- (B) Discuss the importance of setting out works. [5]

OR

- (A) Explain Float gauge with neat sketch. [5]
 (B) Explain with sketch procedure of transferring benchmark of Tunnel. [5]

Section-II

Q-4 (All Compulsory)

- (A) What are the different methods of designation of a curve? Derive a relationship between [5] the radius and the degree of curve.
- (B) Two tangents intersect at a chainage of 1320.50 m, the deflection angle being 24° . [5] Calculate the following quantities for setting out a curve of radius 275 m
 (1) Tangent length (2) Length of long chord (3) Length of curve
 (4) Chainage of point of commencement and tangency (5) Apex distance
- (C) Draw neat sketch of simple circular curve & explain any five components. [5]

OR

- (C) Why are transition and vertical curves provided? What are the advantages & [5] requirements of an ideal transition curve?

Q-5 Answer the following Questions

- (A) The following offsets are taken from a survey line to a curved boundary. Calculate the [5] area included between survey line and irregular boundary by Simpson's rule & Trapezoidal rule

Distance	0	5	10	15	20	30	40	60	80
Offset (m)	2.5	3.80	4.60	5.20	6.10	4.70	5.80	3.9	2.20

- (B) The chainage of the intersection point of two straights is 120 chains + 66 links and the [5] deflection angle is $45^\circ 20'$. A circular curve of 256m radius is to be set out to connect two straights. Calculate the necessary data for setting out the curve by the method of deflection angle. Length of one chain is 20m. Take peg interval = 30m.

OR

- (A) Explain method of calculation of area from coordinates. [5]
 (B) Compare Prismoidal formula with trapezoidal formula for volume. [5]

Q-6 Answer the following Questions

- (A) Explain geographic transformations in G.I.S [5]
 (B) The surface of ground has uniform slope of 1 in 5 in the transverse direction and side slope 1:1. Find the cross sectional area when depth of cutting at centre is 5.0 m and width at the formation level of a certain cutting is 12.0m [5]

OR

- (A) Discuss applications of G.I.S in different Engineering field [5]
 (B) The rectangular excavation pit ABCD of basement of a building. The dimensions of pit [5] are 30m x 16m, and E is the point of Intersection of diagonals. The depths of excavations at Points A, B, C, D & E are as follows.

Point.	A	B	C	D	E
Original level.RL m	55.0	59.0	61.0	57.0	62.0
Depth of Excavation.(Final level)	49.0	50.0	53.0	51.0	53.0

KADI SARVA VISHWAVIDYALAYA
B.E. (Civil) Semester-III Examination, December'2015

Subject Code-CV-306

Date: 09/12/2015

Time: 10:30 am to 1:30 pm

Subject: Surveying

Total Marks: 70

Instructions:

- (1) Answer each section in separate answer sheet
(2) Use of scientific calculator is permitted
(3) All questions are Compulsory
(4) Indicate **Clearly**, the options you attempt along with its respective questions number.
(5) Use the last page of main supplementary for **rough work**

Section-I

Q-1 **(All Compulsory)**

- (A) Discuss loose needle and fast needle methods of theodolite traversing with sketch. [5]
(B) Explain with sketch procedure of setting out the location of pier of bridge. [5]
(C) Draw the sketch of following & write their function [5]
 (1) Alidade (2) U-Fork (3) Trough compass

OR

- (C) In a closed traverse ABCDEA, the lengths of the lines DE and EA could not be [5] measured due to an obstruction. Determine the lengths from the following data.

Line	AB	BC	CD	DE	EA
Length (m)	500	620	468	(?)	(?)
Bearing	$98^{\circ} 30'$	$30^{\circ} 20'$	$298^{\circ} 30'$	$230^{\circ} 00'$	$150^{\circ} 10'$

Q-2 Answer the following Questions

- (A) Draw neat sketch of simple circular curve & explain any five components. [5]
(B) Discuss Repetition method of horizontal angle measurement using Theodolite. What are the advantages of this method? [5]

OR

- (A) A compound curve is made up two arcs of radial 380 m & 520 m. The deflection angle [5] of compound curve is 105° .& that of the first arc of radius 380 m is 58° ,The chainage of the first tangent point is 848.55 m. Find the chainage of the point of intersection, common tangent point and forward tangent point

Q-3 Answer the following Questions

- (A) Explain in detail the procedure for finding out area of an irregular figure using [5]
 (B) In a closed traverse ABCDEA, Adjust the traverse by Transit Rule & Third Rule from [5]
 the following data.

Line	Length(m)	Consecutive coordinate	
		Latitude(m)	Departure(m)
AB	235.10	+218.50	-86.80
BC	317.40	+42.16	+314.59
CD	215.00	-209.49	+48.36
DA	281.60	-50.51	-277.03

OR

- (A) Describe the any one method of locating soundings in hydrographic survey with sketch. [5]
 (B) Find the area of the closed traverse ABCDEA, by departure & total latitude method from the following data.

Line	AB	BC	CD	DA
Latitude	+108	+15	-123	0
Departure	+4	+249	+4	-257

Section-II

Q-4 (All Compulsory)

- (A) A road embankment is 8 m wide & 200 m in length at the formation level, with a side slope of 1.5(H):1(V). The embankment has a rising gradient of 1 in 100 m. The ground levels at every 50 m along the centre line are as follows.

Distance (m)	0	50	100	150	200
Ground RL (m)	174.5	175.2	176.8	177.0	177.2

Take formation level of zero chainage is 176.0 m calculate the volume of earth work by Trapezoidal rule & Prismoidal rule.

- (B) Why are transition and vertical curves provided? What are the advantages & requirements of an ideal transition curve? [5]
 (C) What is hydrographic surveying? Mention the purposes of conducting hydrographic surveying and discuss establishing of horizontal and vertical control points. [5]

OR

- (C) Explain procedure of Radiation and Traversing method of plane table surveying [5]

Q-5 Answer the following Questions

- (A) Discuss the importance of setting out works and Discuss horizontal and vertical control in setting out of works. [5]
 (B) Two tangents intersect at chainage 1350 m. The angle of intersection is 130° , calculate all data necessary for setting out a curve of radius 200 m by Rankin's deflection angle method. The peg interval may be taken as 20 m. The least count of Vernier is $20''$. Calculate data for field checking

OR

- (A) Explain Double Meridian Method in detail to calculate area of traverse. [5]
 (B) A rectangle ABCD, 50 m X 80 m forms the plan of part of an excavation. AD & BC are longer sides & E is the point of intersection of the diagonals. From original surface level & final excavated level, calculate the volume of excavation within ABCD [5]

Point	A	B	C	D	E
Final Level (m)	38.6	39.8	42.6	40.8	42.5
Original Level (m)	45.2	49.8	51.2	47.2	52.0

Q-6 Answer the following Questions

- (A) Explain map projections in G.I.S [5]
 (B) Explain two theodolite method of setting out of curve [5]

OR

- (A) Enumerate in brief the two methods of measurement of area by offsets from the baseline. [5]
 State the relative merits and demerits of each method.
 (B) Discuss applications of G.I.S in different Engineering field [5]

KADI SARVA VISHWAVIDHYALAYA

B.E.Semester : III (Civil Engineering)

Subject code : CV 305

Date : 29/11/13

Subject Name : Surveying

Time : 10 to 1

Total Marks : 70

Instruction :

- (1) Answer each section in separate answer sheet.
- (2) Use of Scientific Calculator is permitted.
- (3) All questions are compulsory.
- (4) Indicate Clearly, the options you attempt along with its respective question number.
- (5) Use the last page of main supplementary of rough work.

Section - I

Q – 1 All Questions are Compulsory

(A) Define :

- (1) Line of Collimation
- (2) Closing Error
- (3) Point of Tangency
- (4) Zero Circle
- (5) Parallax

05

(B) Explain in brief about Gale's Traverse Table.

05

(C) Enlist different methods of Plane Table Survey. Describe method of Intersection with sketch.

05

OR

(C) Explain Reiteration method used for measuring horizontal angle by theodolite.

05

Q – 2 (A) State Bowditch' rule and Transit rule for balancing the traverse.

05

(B) Following are the lengths and consecutive coordinates of a closed traverse ABCDA.

05

Line	Length (m)	Consecutive Coordinates	
		Latitude	Departure
AB	235.10	+ 218.50	— 86.80
BC	317.40	+ 42.16	+ 314.59
CD	215.00	— 209.49	+ 48.36
DA	281.60	— 50.51	— 277.03

Balance the traverse by Bowditch's rule.

OR

(A) Discuss the case where length of one line and bearing of another line is omitted in traverse.

- (B) Following readings were taken for a closed traverse ABCDA, Find out 05 the missing quantities

Line	Length (m)	Bearing
AB	194.1	85° 30'
BC	201.2	15° 00'
CD	165.4	285° 30'
DE	172.6	185° 30'
EA	?	?

- Q - 3 (A) Describe procedure of setting out of simple circular curve by 05 Rankine's method of tangential angle.

- (B) Compute the values of following components of simple circular curve 05 and show them in detailed sketch.

(1) Length of curve (2) Tangent length (3) Length of long chord (4) Apex distance (5) Mid ordinates.

Take radius of curve = 300 m and deflection angle = 40°

OR

- (A) Explain different types of transition curve. 05

- (B) A compound curve consisting of two simple circular curves of radii 05 350 m and 450 m, is to be laid out between two straights. The angles of intersection between the tangents and the two straights are 30° and 60°. Calculate the various elements of the compound curve.

Section - II

- Q - 4 (A) What is reverse curve ? Derive relationship between elements of 05 reverse curve.

- (B) Following offset are taken from a survey line to a curved boundary 05 line :

Distance (m)	0	5	10	15	20	30	40	60	80
Offset (m)	2.4	3.7	4.5	5.3	6.0	4.8	5.7	3.8	2.1

Find the area between the survey line, the curved boundary line, and the first and the last offsets by : (1) trapezoidal rule (2) Simpson rule

- (c) Describe Planimeter with sketch. What is zero circle ? 05

OR

- (c) A road embankment is 8 m wide and 200 m in length at the formation 05 level with a side slope. The embankment has a rising gradient of 1 in 100 m. the ground levels at every 50 m along the centre line are as follows :

Distance (m)	0	50	100	150	200
R.L. (m)	164.5	165.2	166.8	167	167.2

The formation level of zero chainage 166 m. calculate the volume of each work.

- Q - 5** (A) How you determine the capacity of reservoir ? Explain in Detail. 05
 (B) Area enclosed between the Dam and upstream contours at a reservoir site are as follows : 05

Contour Level (m)	54	56	58	60	62
Enclosed Area (Sq. m)	714	6512	52700	79000	374000

If the bottom level is 54 m and the F.R.L is 62 m, determine the capacity of the reservoir by Trapezoidal and Prismoidal formula. Also compute prismoidal correction.

OR

- (A) What is sounding ? What are the advantages of Echo-sounding ? 05
 (B) Write short note on Weddle's sounding machine with sketch. 05

- Q - 6** (A) Explain the process of setting out the culvert. 05
 (B) What is GIS ? Explain coordinate system in brief. 05

OR

- (A) Explain Temporary adjustment of theodolite in detail. 05
 (B) Explain types of Vertical Curves. 05

----- All the Best -----

KADI SARVA VISHWAVIDYALAYA

B.E. (Civil) Semester-III Examination, May'2014

Subject Code-CV-306

Date: 02/05/2014

Time: 10:30 am to 1:30 pm

Subject: Surveying

Total Marks: 70

Instructions:

- (1) Answer each section in separate answer sheet
- (2) Use of scientific calculator is permitted
- (3) All questions are Compulsory
- (4) Indicate **Clearly**, the options you attempt along with its respective questions number.
- (5) Use the last page of main supplementary for rough work

Section-I

Q-1 (All Compulsory)

- (A) How the temporary adjustment of a theodolite carried out? [5]
- (B) Enlist instruments and accessories used for plane table survey. & Explain any two with sketches. [5]
- (C) Enlist different instruments used in measurement of sounding. & Explain any One with sketch. [5]

OR

- (C) Discuss Repetition method of horizontal angle measurement using theodolite [5]

Q-2 Answer the following Questions

- (A) What is meant by balancing a traverse? Explain one rules used to do in detail. [5]
- (B) The following are the length and bearings of the sides of a closed traverse [5]
ABCD Find out the length and bearing of line DA

Line	Length(m)	Bearing(m)
AB	75.0	30° 24'
BC	180.0	110° 36'
CD	60.50	210° 30'
DA	(?)	(?)

OR

- (A) Define the following in reference to the theodolite: [5]
(1) Transiting (2) Axis of level tube (3) Telescope normal
(4) Changing Face (5) Face left
- (B) Define latitude and departure. Differentiate between the consecutive and independent coordinates [5]

Q-3 Answer the following Questions

- (A) Enlist different methods of plane table survey. Explain any one with neat sketch [5]
- (B) Explain equation for Trapezoidal and Simpson's rule to find out area of an irregular boundary. [5]

OR

- (A) Explain the process of setting out the culvert. [5]
- (B) Explain coordinate system in G.I.S. [5]

Section-II

Q-4 (All Compulsory)

- (A) Explain the procedure of setting out of Building Foundation [5]
(B) State the advantages and disadvantages of plane table survey [5]
(C) Explain different vertical curves with sketch. [5]

OR

- (C) Describe the method of setting out of a simple circular curve by Rankine's deflection angle method. [5]

Q-5 Answer the following Questions

- (A) Why are curves provided? Draw the neat sketch of simple circular curve showing various elements of it. [5]
(B) Two straights intersect at chainage 3080.00 m and the angle of intersection is 130° . If the radius of the simple curve to be introduced is 600 m, find the following:
(1) Tangent distances
(2) Length of the long chord.
(3) Chainage of the point of commencement
(4) Length of curve

OR

- (A) An embankment of width 12.0 m and side slopes 1.5: 1 is required to be made on a ground which is level in a direction transverse to the center line. The central height at 40 m intervals are as following. Calculate the volume of earth work according to (1) Trapezoidal formula and (2) Prismoidal formula
2.00, 2.25, 3.15, 3.50, 2.85, 2.35, and 1.90
(B) Describe how you will calculate area of traverse from coordinate. [5]

Q-6 Answer the following Questions

- (A) What is hydrographic surveying? Mention the purposes of conducting hydrographic surveying & discuss establishing of horizontal and vertical control points.
(B) Area enclosed between the dam and upstream contours at a reservoir are as follows [5]

Contour level (m)	64	66	68	70	72
Enclosed Area (sq.m)	714	6512	52700	79000	374000

If the bottom level is 64 m and the F.R.L is 72 m, determine the capacity of the reservoir by trapezoidal and prismoidal formula

OR

- (A) Explain Map projections [5]
(B) Define sounding. Enlist different method for sounding of locating soundings. Explain any one method. [5]

*** All the Best***

KADI SARVA VISHWAVIDYALAYA

B.E. (Civil) Semester-III Examination, November'2014

Subject Code-CV-306

Date: 21/11/2014

Subject: Surveying

Time: 10:30 am to 1:30 pm

Total Marks: 70

Instructions:

- (1) Answer each section in separate answer sheet
- (2) Use of scientific calculator is permitted
- (3) All questions are Compulsory
- (4) Indicate **Clearly**, the options you attempt along with its respective questions number.
- (5) Use the last page of main supplementary for **rough work**

Section-I

Q-1 (All Compulsory)

- (A) Discuss Repetition method of horizontal angle measurement using Theodolite. What are [5] the advantages of this method?
- (B) In a closed traverse, the lengths of the lines DE and EA could not be measured due to an [5] obstruction. Determine the lengths from the following data.

Line	Length(m)	Bearing
AB	500	98° 30'
BC	620	30° 20'
CD	468	298° 30'
DE	(?)	230° 00'
EA	(?)	150° 10'

- (C) Define following terms for the Vernier transit theodolite: [5]

- (1) Transiting
- (2) Swinging the telescope
- (3) Departure
- (4) Line of collimation
- (5) Balancing of traverse

OR

- (C) Define theodolite traversing. Enlist different methods of theodolite traversing and [5] describe Included angle method

Q-2 Answer the following Questions

- (A) Describe with neat sketch, the method of intersection use for plane table survey. [5]
- (B) The following data were obtained for a closed traverse ABCDEFA which was run in the clockwise direction. Compute corrected consecutive co-ordinates using. Use Bowditch's rule for balancing of the traverse. [5]

Line	Length(m)	Bearing	Included Angle
AB	36.50	150° 59'40"	A = 87° 00'00"
BC	40.00		B = 122° 15'40"
CD	34.50		C = 156° 11'20"
DE	24.56		D = 90° 30'40"
EF	41.50		E = 140° 59'40"
FA	51.80		F = 123° 00'00"

OR

- (A) What is 'closing error'? What are the different methods of balancing the closing error in [5] a closed traverse? Explain Third rule's method

- (B) In closed traversed ABCDA, setting up the plane table at a station P, it was found that the point op', representing the station P on the plan was exactly above the corresponding station P on the ground. Find area of ABCDA by method of radiation if scale is 1cm: 10.00 m [5]
 If the distance of line (1) pa=10.00, (2) pb= 11.20, (3) pc= 12.15, (4) pd= 12.25, (5) ab=14.50, (6) bc=16.25, (7) cd=17.80, (8) de=16.55

Q-3 Answer the following Questions

- (A) What is sounding? State different methods of locating sounding and explain any one method [5]
 (B) Explain the basic procedure, instruments and materials required to set out the foundation of a building on the ground as per the plan. [5]

OR

- (A) Discuss horizontal and vertical control points in hydrographic surveying. What are the main purposes for which hydrographic surveying are carried out? [5]
 (B) Explain with sketch procedure of setting out the Culvert. [5]

Section-II

Q-4 (All Compulsory)

- (A) Why are curves provided? Draw neat sketch of compound curve, reverse curve and transition curve and show elements of these curves thereon. [5]
 (B) Two tangents intersect at a chainage of 1200 m the deflection angle being 24° . Calculate the following quantities for setting out a curve of radius 350 m
 (1) Tangent length (2) Length of long chord (3) Length of curve
 (4) Chainage of point of commencement and tangency (5) Apex distance
 (C) Draw neat sketch of simple circular curve & explain following terms:
 (1) Tangent distance (2) Long chord (3) Point of Intersection
 (4) Apex distance (5) Mid- ordinate [5]

OR

- (C) Explain Rankine's method of tangential angle for setting out simple circular curve [5]

Q-5 Answer the following Questions

- (A) A road embankment is 10.00 m wide. The stations are 50 m apart 250 m in length at the formation level, with a side slope of 1:1. The embankment has a rising gradient of 1 in 100.00 m. The ground levels at every 50.00 m along the centre line are as follows Take formation level of zero chainage is 101.50 m calculate the volume of earth work by trapezoidal rule & Prismoidal rule.

Distance (m)	0	50	100	150	200	250
Ground R.L.(m)	101.00	101.20	101.80	102.00	103.70	104.20

- (B) A transition curve is required for a circular curve of 350 m radius, the gauge being 1.0 m and maximum super elevation is restricted to 10 cm. Take $g = 9.81 \text{ m/sec}^2$ Calculate the required length of transition curve and design speed if
 (1) Super elevation is applied at a rate of 1 in 400.
 (2) Super elevation of 4 cm is provide on the distance covered by vehicle in one second
 (3) The rate of change of radial acceleration is $0.3 \text{ m/sec}^2/\text{sec}$ [5]

OR

(A) Explain procedure for area of traverse from latitude & double meridian distance method [5]

(B) From following multilevel section data. Calculate cross section area. The width of the road at formation level is 10.0 m The side slope is 1:1 [5]

Station	Left		Centre	Right	
1	2.00	3.00	5.00	5.00	6.00
	5.00	2.50	0	3.00	9.00

Q-6 Answer the following Questions

(A) Define G.I.S. Explain Co-ordinate System in G.I.S [5]

(B) Area enclosed between the dam and upstream contours at a reservoir site are as follows [5]
If the bottom level is 100 m & the F.R.L is 150 m, determine the capacity of the reservoir by trapezoidal & Prismoidal formula.

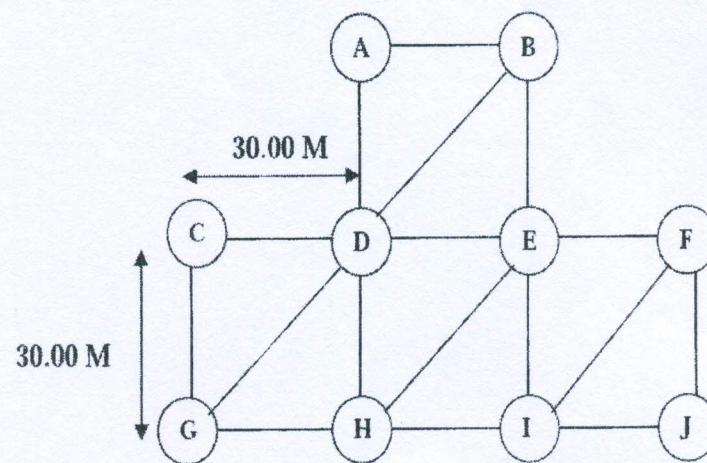
Contour level (m)	100	110	120	130	140	150	160
Enclosed Area (sq.m)	40	90	100	120	150	240	270

OR

(A) Explain map projections in G.I.S with sketch. [5]

(B) Determine the volume of earth required to be excavated for the plot of 30.0 m X 30.0 m. on land shown in Fig The formation level is 69.0 m [5]

Junction	A	B	C	D	E	F	G	H	I	J
Existing GL RL m	73.5	74.2	72.9	71.2	70.5	72.3	74.0	73.2	78.9	78.8



***** *All The Best* *****