II B.Tech. II Semester Regular Examinations, April/May -2005
SURVEYING-II
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain how you will run a straight line between two points in the following cases
   i. Both ends intervisible
   ii. Both ends are not intervisible from any intermediate point.
   (b) With two theodolites, how an intersection point of two straight lines is located.

2. (a) Explain the analytical methods of balancing a closed traverse.
   (b) Two points A and D are connected by a traverse survey ABCD and the following records are obtained
   AB = 219.0 m; BC = 170.5 m; CD = 245.75 m; Angle ABC = $118^0\ 15^1$.
   Assuming that AB is meridian, determine:
   i. The latitude and departure of D relative to A
   ii. The legth of AD
   iii. The angle of BAD

3. (a) Derive the fundamental equation of tangential tacheometery.
   (b) To determine the constant multiplier of a tacheometer the following observations were taken on a staff held vertically at a distance measured form the instrument:

Observation No.	Horizontal Distance (m)	Vertical angle	Stadia reading
1	60	$0^0\ 00^1$	0.835, 1.425
2	120	$1^0\ 15^1$	1.140, 2.345
3	180	$1^0\ 40^1$	1.240, 2.990

   Find the mean value of the multiplier, given that the additive constant was 0.25 m.

4. (a) If in a compound curve, the directions of two straights and one radius are known, how will you find out analytically the radius of the other curve.
   (b) A compound curve, consists of two simple circular curves of radii 350 m and 500 m, is to be laid out between two straights. The angles of intersection between the tangents and the two straights are 25^0 and 55^0. Calculate the various elements of the compound curve.

5. Two straights on the centre line of a proposed railways intersect at 1270.8 metres, the deflection angle being $38^0 24'$. It is proposed to put in a circular curve of 320 m radius with cubic parabolic transition curve 36 m long at each end. The combined curve is to be set out by the method of deflection angles with pegs at every 20 m through chainage on the transition curves and with pegs at every 10 m radius of through chainage on the circular curve. Tabulate the data relative to the first two stations on the first transition curve and the junctions of the transition curve with circular arc.

6. To find the elevation of the top (Q) of a hill, a flagstaff of 2 m height was erected and observations were made from two stations P and R, 60 meters apart. The horizontal angle measured at P between R and the top of the flat staff was 60^0 30' and that measured at R between the top of the flagstaff and P was 68^0 18'. The angle of elevation to the top of the flagstaff was measured to be 10^0 12' at P. The angle of elevation to the top of the flagstaff was measured to be 10^0 48' at R. Staff readings on B.M when the instrument was at P = 1.965 m and that with the instrument at R = 2.055 m. Calculate the elevation of the top of the hill if that of B.M. was 435.065 m.

7. (a) What are the factors that affect the selection of triangulation stations?
   (b) What are the various correction for the base line. Discuss in brief.

8. Adjust the angles α and β, observations of which give
   $\alpha = 20^0$ 10' 10" weight 6
   $\beta = 30^0$ 20' 30" weight 4
   $\alpha + \beta = 500$ 30' 50" weight 2

⋆ ⋆ ⋆ ⋆ ⋆

II B.Tech. II Semester Regular Examinations, April/May -2005
SURVEYING-II
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Two stations at elevations of α and β are sighted by a theodolite in which the line of collimation is inclined to the trunnion axis at an angel (90^o - e), where 'e' is small.
   i. Derive an expression for the error in the horizontal angel between the two stations as given by the instrument.
   ii. Show by a diagram the effect of the collimation error on the vertical circle reading of one station.
   iii. What is the effect of measuring the horizontal and vertical angles on both faces?

   (b) In a straight line ABC, AB measure 354.384 m, BC measures 282.092 m and AC measures 636.318 m using a particular EDM reflector combination. A line measures 533.452 m with this instrument reflector combination. What is the correct length of the line?

2. (a) Write the various steps that are usually necessary for Gales Traverse table computation.

   (b) The bearings of two inaccessible stations A and B taken from station C were $225^0\ 00^1$ and 153^020^1 respectively. The coordinates of A and B were as under:

Station	Easting	Northing
A	300	200
A	400	150

   Calculate the Independent co-ordinates of C.

3. (a) A tacheometer fitted with stadia wires 4 mm apart has its object glass (f = 200 mm) fixed at a distance of 250 mm form the trunnion axis. From the first principles establish the tacheometeric distance equation if the staff intercept is 'S'

   (b) Describe the conditions under which tacheometric surveying is advantageous.

4. (a) What do you understand by the following forms of the curves and where are they generally used?
   i. Circular Curve
   ii. Compound curve
   iii. Reverse curve

(b) A reverse curve is to be set out between two parallel tangents 30 m apart. The line joining the two tangent points is 300 m. The two arcs of the curve have the same radius. Calculate the necessary data to set the curve on the field by offsets from a long chord at intervals of 20 m from the common tangent point.

5. A transition curve is required for a circular curve of 400 m radius, the gauge being 1.5 m between rail centre and maximum super-elevation restricted to 12 cm. The transition is to be designed for a velocity such that no lateral pressure is imposed on the rails and the rate of gain of the radial acceleration is 30 cm/sec3. Calculate the required length of transition curve and the design speed.

6. The following reciprocal observations were made from two points: P and Q :

Horizontal distance between P and Q	= 4860 m
Angle of elevation of Q at P	= 1^0 5' 21"
Angle of depression of P at Q	= 1^0 0' 50"
Height of instrument at P	= 1.35 m
Height of signal at P	= 6.10 m
Height of instrument at Q	= 1.38 m
Height of signal at Q	= 6.21 m

Find the difference in level between P and Q and the co-efficient of refraction. Take R sin 1" = 30.88 m

7. (a) What do you understand by horizontal control? What are different methods of establishing a horizontal control?

(b) What considerations you would have while selecting the site for the base line

8. Adjust the angles α and β, observations of which give

$\alpha = 20^0$ 10' 10"	weight 6
$\beta = 30^0$ 20' 30"	weight 4
$\alpha + \beta = 500$ 30' 50"	weight 2

⋆ ⋆ ⋆ ⋆ ⋆

Code No: RR220106 **Set No.3**

II B.Tech. II Semester Regular Examinations, April/May -2005
SURVEYING-II
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain how you will run a straight line between two points in the following cases
   i. Both ends intervisible
   ii. Both ends are not intervisible from any intermediate point.
   (b) With two theodolites, how an intersection point of two straight lines is located.

2. (a) What is meant by traversing? Describe the fast needle method of traversing.
   (b) Following are the lengths and bearings of traverse ABCDE

Line	Length in m	Bearing
AB	229.0	$198^0 59^1$
BC	131.35	$28^0 14^1$
CD	80.00	$320^0 13^1$
DE	199.25	$35^0 13^1$

   Calculate the length and bearing of the line EA which could not be surveyed due to an obstruction in the way.

3. The following readings are taken with an anallactic tacheometer setup at the station A, B and C in connection with an open traverse ABCD. The staff being held vertically at each station

Instrument Station	Height of instrument	Staff station	Stadia readings	Inclination of line of sight
A	1.325 m	B	0.645,1.060,1.475	$+1^0 45^1$
B	1.380 m	C	1.060,1.425,1.790	$-2^0 54^1$
C	1.425 m	D	1.690,1.115,1.540	$+2^0 48^1$

   The reduced level of the station A is 51.650 m. Determine the horizontal distances AB, BC and CD and the reduced levels of B,C and D.

4. (a) What are the different instrumental methods available to set out a simple circular curve. Explain in detail the Rankine's method of tangential angle to set out a curve in the field.
   (b) Using Perpendicular Offset from the tangents method, Calculate the offsets at 20 m intervals along the tangents to locate a curve having a radius of 400 m, the deflection angle being 60^0.

5. In a road curve between two straights having deflection angle of 108^0 Bernoullis Lemniscate is used as a curve transitional throught. Make necessary calculations for setting out the curve if the apex distance is 20m.

6. The following reciprocal observations were made from two points P and Q:
   Horizontal distance = 16440 m
   Angle of depression of Q at P = 0^0 3' 42"
   Angle of depression of P at Q = 0^0 2' 4"
   Heights of instrument at both P and Q = 1.42 m
   Height of signal at P and Q = 5.53 m
   Calculate
   (a) the R.L. of Q, if that of P is 346.39 m; and
   (b) The average co-efficient of refraction at the time of observation. Take R sin 1" = 30.88 m.

7. (a) Find the sag correction for 30 m steel tape under a pull of 80 N in three equal spans of 10 m each. Mass of one cubic cm at steel = 7.86 g/cm^3. Area of cross-section of the tape = 0.10 sq. cm.
   (b) A steel tape is 30 m long at a temperature, of 65F when lying horizontally on the ground, Its sectional area is 0.082 sq. cm, its mass 2 kg and coefficient of expansion 65 x 10^-7 per 1^0 F. The tape is stretched over three equal spans. Calculate actual length between the end graduations under the following conditions: temp. 85^0 F, pull 180 N. Take E = 2.07 X 10^7 N/cm^2.

8. Adjust the angles α and β, observations of which give
   $\alpha = 20^0$ 10' 10" weight 6
   $\beta = 30^0$ 20' 30" weight 4
   $\alpha + \beta = 500$ 30' 50" weight 2

⋆ ⋆ ⋆ ⋆ ⋆

II B.Tech. II Semester Regular Examinations, April/May -2005
SURVEYING-II
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) The horizontal axis of a theodolite when setup and levelled, is not truly horizontal. How does it effect the observed angular measurements?
   (b) Describe temporary adjustments of a transit theodolite. Explain how you would measure horizontal and vertical angel with a theodolite.

2. (a) What are the different methods of adjusting a traverse in Gales system? Explain one of the rules in detail.
   (b) The bearing of two inaccessible stations 'A' and 'B' taken from station 'C' were $225^0 00^1$ and $153^0 26^1$ respectively. The coordinates of 'A' and 'B' were as under

Station	Easting	Northing
A	300	200
B	400	150

   Calculate the independent coordinates of 'C'.

3. (a) The staff intercepts on a staff held vertically at distance 50 m and 150 m from a theodolite station were 0.500 m and 1.500 respectively. When the line of sight is horizontal. Then the instrument was shifted and set up over a station A. The staff readings on a vertical staff at B were 1.500, 1.700 and 1.900 and the vertical angle was $10^0 45^1$. The RL of the station A was 100.000 and the height of the instrument there was 1.750m. Calculate the distance AB and the reduced level of station B.
   (b) A Traverse ABCD was run by a tacheometer fitted with an anallactic lens and having a multiplying constant as 100. The following readings were taken with the staff held normal:

4. (a) What are the different elements of a simple curve. With the help of neat sketches, derive the expressions for the elements of a simple curve.
   (b) A Railway siding is to be curved through a right angle and in order to avoid buildings. The curve is to be compound, and radii of the two branches are 240 m and 360 m. The distance from the intersection point of the end straight to the tangent point at which the 240 m radius curve leaves the straight is 300 m. Obtain the second tangent length of whole curve.

5. What is a transition curve? Why it is used? Define 'shift' of a curve. Draw two tangents and show a circular curve and two transition curves connecting the tangents, marking the 'shift', on your sketch. How the transition curve be set out. Explain.

6. Find the difference of levels of the points P and Q and the R.L. of P from the following data. :
   Horizontal distance between P and Q = 7118 m
   Angle of depression to P at Q = $1^0$32' 12
   Height of signal at P =3.87 m
   Height of instrument at Q =1.27 m
   CO-efficient of refraction =0.07
   R sin 1" = 30.88 m ;
   R.L. of Q = 417.860m

7. Directions are observed from a satellite station S, 62.18 m from station C, with the following results:

   (a) 0^0 0' 0" ;

   (b) 71^0 54' 32";

   (c) 296^0 12' 2".

   The approximate lengths of AC and BC are respectively 8041 m and 10864 m. Calculate the angle ACB.

8. (a) What do you understand by propagation of errors? Give various laws of propagation.

   (b) Explain the procedure for adjustment of a braced quadrilateral.

⋆ ⋆ ⋆ ⋆ ⋆