IES COLLEGE OF ENGINEERING, CHITTILAPPILLY
DEPARTMENT OF CIVIL ENGINEERING

CET 205 SURVEYING & GEOMATICS

QUESTION BANK

MODULE I

SHORT ANSWER QUESTIONS

1. What are the principles of working from whole to part in surveying?
2. Explain dip, declination, latitude and departure?
3. What is resection method in plane table surveying and how is it different from other methods?
4. Explain linear, angular and graphical methods?
5. Write short note on methods of orientation in plane table survey?
6. Explain about the longitudinal and cross section levelling?
7. Describe with neat sketch, how it is possible to measure the distance between two points A and B using chain/tape, if the region between A and B is obstructed by high ground or small hill rocks. Mention the method used.
8. Define a) Elevation, b) Bench mark, c) Change point, d) B.S, I.S and F.S, e) Datum and f) Level surface
9. Explain errors in levelling?
10. Explain the essential parts of dumpy level with figure?

ESSAY QUESTIONS

11. Explain the prismatic and magnetic compass and brief the difference?
12. What is three point problems in plane plane table surveying? Explain
13. What is whole circle and reduced bearing? How the conversion is possible?
14. Explain about ranging?
15. The bearings of the sides of a traverse ABCDE are as follows:

Side	Fore bearing	Back bearing
AB	107^0	$287^015'$
BC	$22^030'$	$202^00'$
CD	$281^030'$	$101^030'$
DE	$189^00'$	$9^015'$
EA	$124^015'$	$304^045'$

Find the stations affected by local attraction and compute the corrected bearing?

16. The following consecutive readings were taken with a level and 5 metre levelling staff on continuously sloping ground at a common interval of 20 metres: 0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, and 4.485. The reduced level of the first point was 208.125 m. Rule out the page of a level field book and enters the above readings. Calculate the reduced levels of the points by rise and fall method and also the gradient of the line joining the first and the last point?

17. Explain the method with neat sketch, when it is not possible to set up the level midway between two stations?

18. The following staff readings were observed in sequence: 1.324, 2.605, 1.385, 0.638, 1.655, 1.085, 2.125 and 1.555. The instrument was shifted after the third and sixth readings. The third reading was taken to be an arbitrary benchmark of elevation 75,000. Find the reduced level off points using height of collimation method?

19. Explain the characteristics, methods and uses of contouring?

20. Explain digital and auto level

MODULE II

SHORT ANSWER QUESTIONS

1. Explain the importance of traversing in surveying and how is it done using a theodolite?
2. Mention the characteristics and uses of mass haul diagram?
3. What is mass haul diagram? Explain the construction?
4. Explain the measurement of vertical angle?
5. Explain the essential parts of theodolite with figure?
6. Explain the principle of triangulation system and brief about the types of triangulation stations?
7. Explain the concept of satellite station and reduction to centre?
8. Explain the methods of marking a triangulation station on the ground?
9. What are the different classifications of triangulation stations? Which is the most accurate and why?
10. What do you mean by triangulation figures? Explain
11. What are the factors that affect the selection of triangulation stations?
12. What is meant by strength of figure? How is it determined?

ESSAY QUESTIONS

13. The values of offsets in metres of an irregular plot to the chain line are given at 10 m interval. Find the area between the chain line and the irregular boundary by trapezoidal rule and simpson's rule.

Offsets (m)   3.6   5.3   6.3   6.2   5.4   6.8   7.4   6.4   8.0

Distance (m)   0   10   20   30   40   50   60   70   80

14. Describe the methods to find out the horizontal angle using theodolite?

15. The following perpendicular offsets were taken from a chain line to a hedge:

Chainage (m)	0	15	30	45	60	70	80	100	120	140
Offset (m)	7.60	8.5	10.7	12.8	10.6	9.5	8.3	7.9	6.4	4.4

Calculate the area between the survey line, the hedge and the end offsets by a) trapezoidal rule b) simpson's rule

16. The following table gives the corrected latitudes and departures (in metres) of the sides of a closed traverse ABCD:

Side	Latitude		Departure	
	N	**S**	**E**	**W**
AB	108		4	
BC	15		249	
CD		123	4	
DA	0			257

Calculate its area by (i) M.D method (ii) D.M.D method and (iii) Departure and Latitude method

17. A railway embankment 400 m long is 12 m wide at the formation level and has the slope 2:1. The ground levels at every 100 m along the centre line are as under:

Distance	0	100	200	300	400
R.L	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork using trapezoidal and prismoidal rule?

18. A rectangular plot ABCD forms the plane of a pit excavated for road work. E is point of intersection of the diagonals. Calculate the volume of the excavation in cubic metres from the following data:

Point	A	B	C	D	E
Original Level	45.2	49.8	51.2	47.2	52
Final Level	38.6	39.8	42.6	40.8	42.5

Length of AB = 50 m and BC = 80 m.

19. (a) Explain different types of signals and towers used in triangulation survey?
(b) Observations are made from instrument station A to the signal at B. the sun makes an angle of 60^0 with the line AB. Calculate the phase correction if (i) the observation was made on the bright portion, and (ii) the observation was made on the bright line. The distance AB is 9460 metres. The diameter of the signal is 12 cm.

20. The altitudes of 2 proposed stations A and B, 100 km apart, are respectively 420 m and 700m. The intervening obstruction situated at C, 70 km from A has an elevation of 478 m. Ascertain if A and B are intervisible, and if necessary, find by how much B should be raised so that the lines of sight must now where be less than 3 m above the surface of the ground.

21. 'A' is a station of triangulation survey to which observations have been made from a neighbouring station. 'A' cannot be used as an instrument station. The theodolite is placed at 'S' near 'A'. Show the angles observed from 'S' may be adjusted to give the value that have been obtained at 'A'.

22. Directions are observed from a satellite station 'S', 250 m from satellite station 'C' with the following data results <A= $0^0$0'0", <B = $71^0$54'32", <C = $296^0$12'02". The approximate length of AC and BC are respectively 27036 and 35642 m. Calculate the angle ACB

MODULE III

SHORT ANSWER QUESTIONS

1. What is meant by closing error? How will you distribute the angular error of closure?
2. Compare fast needle method and loose needle method of traverse surveying.
3. Explain the graphical method of balancing of traverse for compass survey.
4. Distinguish between closed traverse and open traverse
5. In a traverse, latitude and departure of the sides were calculated and it was observed that ΣL=1.39m and ΣD = -2.17m. calculate the length of the closing error and its orientation.
6. Brief about probable error and most probable value?
7. Explain laws of weight?
8. Explain the different types of errors?
9. Explain method of least squares and also explain the four cases?
10. (a) Form the normal equations for x, y and z in the following equations of equal weight:
    3x + 3y + z-4 = 0
    x + 2y + 2z-6 = 0
    5x + y + 4z-21 = 0
    (b) If the weights of the above equations are 2, 3 and 1 respectively, form the normal equations for x, y and z.

ESSAY QUESTIONS

1. The following are the lengths and magnetic bearings of the sides of a traverse ABCD. Find the error of closure and its orientation.

Line	length (m)	Bearings
AB	470	$340^0$52'
BC	640	$85^0$40'
CD	430	$170^0$40'

DA	560	$265^0 12^{'}$

7 A closed traverse ABCDA is conducted in field. The survey details are as given below.

Line	length (m)	Bearings
AB	371	$0^0 42^{'}$
BC	164	$94^0 42^{'}$
CD	245	$183^0 04^{'}$
DA	192.5	$232^0 51^{'}$

Compute the coordinates for the traverse by applying correction to constitutive coordinates by Bowditch's rule

8 While making a traverse survey, a surveyor started from point A, walked 1000m in S67°W and reached point B. Then he changed his direction and walked 512m in N10° E and reached point C. Then again the changed his direction and walked 1504m in S65°E and reached point D. Now the surveyor wants to return to A. Which direction should we move in and how many meters?

11. Find the most probable value of angles A, B and C of a triangle ABC, from the following observation equation:
$A = 68^0 12^{'} 36^{''}$
$B = 53^0 46^{'} 12^{''}$
$C = 58^0 01^{'} 16^{''}$

12. The following are the direct observations of a base line:
3678.32 m, 3678.38 m, 3678.00 m, 3678.26 m and 3678.98 m. Find the most probable value of the length of the base line and its probable error?

13. The angles of triangle ABC were recorded as follows:
$A = 77^0 14^{'} 20^{''}$ weight = 4
$B = 49^0 10^{'} 35^{''}$ weight = 3
$C = 53^0 04^{'} 52^{''}$ weight = 2
Find the corrected values of the angles by normal equation method.

14. The observations closing the horizon at a station are:
$A = 24^0 22^{'} 18.2^{''}$ weight = 1
$B = 30^0 12^{'} 24.4^{''}$ weight = 2
$A + B = 102^0 26^{'} 9^{''}$ weight = 3
$C = 305^0 35^{'} 13.9^{''}$ weight = 2
$B + C = 335^0 37^{'} 38^{''}$ weight = 3
Find the most probable value of the angles A,B and C

15. The following observations are taken at a station 'O':
$AOB = 87^0 34^{'} 22^{''}$ weight 2
$BOC = 98^0 42^{'} 18^{''}$ weight 3

COD = $102^0 26'9''$ weight 4
DOA = $71^0 17'4''$ weight 1
Find the probable values of the angles?

MODULE IV

SHORT ANSWER QUESTIONS

1. Explain Rankine's method of setting out of a simple curve.
2. Two tangents intersect at chainage 60+60, the deflection angle being $52^0 30'$. Calculate the necessary data for setting out a curve of 20 chains radius to connect the two tangents if it is intended to set out the curve by offsets from chords. Take peg interval equals to 20 m and the length of chain as 20m.
3. Explain any two methods of setting out simple curves
4. List out the different types of electronic distance measuring instruments?
5. Explain about field astronomy?
6. Briefly discuss about total stations?
7. List out various input data to be given for distance measurement with total station?
8. Differentiate between celestial horizon and sensible horizon?

ESSAY QUESTIONS

9. State the sources of errors in total station and briefly explain each one of them?
10. Briefly explain the principle and type of EDM?
11. Explain the field procedure for total station? Also explain the advantages and applications?
12. Explain the following astronomical terms:
    (i)   Zenith and Nadir
    (ii)   Latitude and Co-latitide
    (iii)   Altitude and Co-altitude
    (iv)   Hour Circle and Hour Angle
    (v)   Celestial sphere and Equinotical points
13. Explain the principle of total station and parts?
14. Two roads having deviation angle 40° at apex point V are to be joined by a 300m radius circular curve. If the chainage of the apex point is 1200.2m, calculate the ordinates from long chord at 15m interval to set out the curve

MODULE V

1   What are the components of a GPS system. Explain each one.
2   Write the applications of GPS.

3 Explain the position calculating procedure in GPS survey.

4 Explain the GPS errors.

5 Explain the structure of a satellite signal.

6 Differentiate between code phase and carrier phase measurement.

7 List the parameters affecting the accuracy of GPS positioning.

8 Explain the position calculating procedure in GPS survey.

9 Explain data sheet and visibility diagram. Write its importance

10 What is mean by DGPS. How is it significant?

11 Explain the static and rapid static methods of GPS survey.

12 Explain the GPS surveying methods.

13 Explain the planning and preparation works to be carried out for a GPS survey. Also explain   the preparation of project report.

14 Explain the different phases of GPS survey.

15 Explain the difference between rapid static method and kinematic method of GPS surveying.

16 What are the types of scattering in Remote sensing? Differentiate between them.

17 Explain electromagnetic spectrum and atmospheric window with the help of sketches.

18 Brief on the four different image resolutions of Remote sensing.

19 What is meant by multispectral scanning? Explain along track and across track scanning.

20 Describe the principle of remote sensing? Explain passive and active remote sensing.

21 What is meant by spectral reflectance? Explain the reflectance characteristics of vegetation, soil and water with the help of spectral reflectance curve.

22 Write a short note on spatial data and attributed data.

23 What is buffering in GIS data analysis?

24 Explain vector data model. Its advantages and disadvantages.

25 What is RMS error? How is it significant in data analysis

26 With proper sketch , differentiate cylindrical, planar conical map projection.

27 Write a note on i) spatial data   ii) attribute data

28 Explain geographic coordinate system and projected coordinate system.

29 Explain Mercator projection. Write down its properties and limitations.

30 List down the types of map projections according to projection surface. Explain any two with sketches.