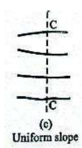
COURSE OUTCOME 1

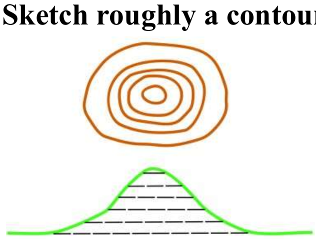
PART A

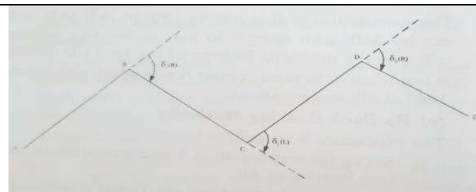
I. Answer the questions in one word or one sentence. Each question carries one mark.

1	**Trunnion axis of theodolite is …….** Horizontal axis (about which the telescope transists)	1
2	**Define contour** Contour is an imaginary line on the ground, by joining the points of same elevation.	1
3	**Draw contour lines for uniformly sloping ground** 	1
4	**Define swinging** It means turning the telescope about its vertical axis in the horizontal plane.	1
5	**Define deflection angle** The angle, which a line makes with the prolongation of the proceeding line.	1
6	**Define the terms swinging and transitting of the theodlite** Swinging: It is the process of turning the telescope about its vertical axis in the horizontal plane. Transitting: It is the process of turning the telescope in vertical plane through 180° about horizontal axis.	

PART B

II. Each question carries three marks.

7	**Sketch roughly a contour representing a hill** 	3
8	**Explain the procedure for finding the deflection angle of a traverse line.**	3

	 • Set up the instrument at the starting station A. Level it and measure the magnetic bearing of the AB by usual method. • Shift the instrument to station B. Level it set the vernier 'A' to read zero by using upper clamp and upper tangent screw. Unclamp the lower plate and rotate the telescope to take a back sight on A the vernier still reads zero. • Transit the telescope. Now the telescope points along AB produced. Release the upper clamp and turn the telescope clock wise to take foresight on C. Bisect 'C' exactly by using the upper tangent screw. Read both the verniers. The deflection d, is equal to the mean of the two verniers. The direction of the deflection angle is to be noted. The direction of deflection angle is right (R). • Change the face to face right and again determine the deflection angle. The required deflection angle is equal to the average of two values obtained with face left and face right. • Repeat the process at all stations. It is to be noted that if the telescope is rotated after plunging towards clockwise direction the deflection angle is right and if the telescope is rotated in counter clockwise direction the deflection angle is left. • Measure the lengths of the traverse lines and locate details if any.	
9	**List any three uses of theodolite** • Measure horizontal angle • Measure vertical angle • Measure bearing of line	3x1
10	**Differentiate between transit and non-transit theodolites** Transitt theodolite : Line of sight can be reversed 180 degree by revolving the telescope Non- Transitt theodolite: Telescope cannot be reversed	2x1.5
11	**List the temporary adjustments of a theodolite** • Setting up • Centering • Levelling up • Focusing eyepiece • Focusing objective	3x1

PART C

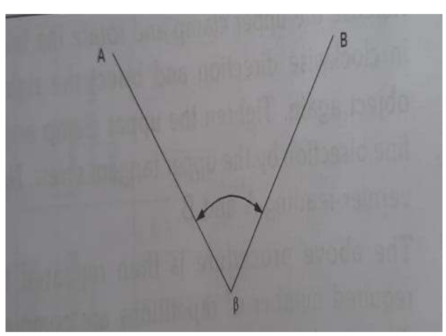
II. Each question carries <u>seven</u> marks.

<table>
<tr><td>12</td><td>The area enclosed by various contours plotted at a proposed reservoir site is given below.

Contour(m)	**200**	**205**	**210**	**215**	**220**
Area (ha)	**3**	**8**	**15**	**20**	**25**

Find the volume of water in the reservoir in cubic meters using both prismoidal and trapezoidal rule.

Contour interval = 205 – 210 = 205 – 200 = 5 m
Trapezoidal formula:
Volume,V = $h\left(\frac{A1+An}{2} + A_2 + A_3 + \ldots + A_{n-1}\right)$
Volume,V = $5\left(\frac{3+25}{2} + 8 + 10 + 15 + 20\right)$
Volume,V = 335 ha- m
Prismoidal formula:
From RL 200 to 220
Volume,V = $\frac{h}{3}(A_1+A_n + 4(A_2+A_4+\ldots)+2(A_3+A_5\ldots))$
Volume,V = $\frac{5}{3}(3+20 + 4(8)+2(15))$
Volume,V = 225 ha-m
From RL 220 to 225
Volume,V = $\frac{20+25}{2}(5)$
Volume,V = 112.50 ha-m
Total volume = 225+112.50 = 337.5 ha-m</td><td>1
1
1
1
1
1
1</td></tr>
<tr><td>13</td><td>Explain the repetition method for horizontal angles.



The repetition method is generally adopted where degree of accuracy desired.</td><td>2</td></tr>
</table>

- In this method the horizontal angle is measured three times with face left and face right, keeping the vernier reading at the end of each measurement unchanged.
- Thus the final reading in the first set becomes the initial reading in the next set and so on.
- Thus there is mechanical addition of angle several times.
- The required mean horizontal angle is then found by dividing the final reading by number of repetitions. (Generally three with face left and three with face right.)

5

14 **The area within contour lines of a pond is given below. Taking 150 as the bottom level of pond and 160 as the top level calculate the volume of soil to fill the pond. Use trapezoidal or prismoidal formula to compute volume**

Contour(m)	**150**	**152**	**154**	**156**	**156**	**158**
Area (m^2)	**30**	**100**	**700**	**1400**	**2700**	**4150**

Contour interval = 154 – 152 = 152 – 150 = 2 m 1

Trapezoidal formula:

Volume,V = h ($\frac{A1+An}{2}$ +A_2 +A_3+….+A_{n-1}) 1

Volume,V = 2 ($\frac{30+4150}{2}$ +100 +700+1400+2700) 1

Volume,V = 11890 m^3 1

Prismoidal formula:

Volume,V = $\frac{h}{3}$ (A_1+A_n + 4(A_2+A_4+…)+2(A_3+A_5…)) 1

Volume,V = $\frac{2}{3}$ (30+4150 + 4(100+1400)+2(700+2700)) 1

Volume,V = 11890 m^3

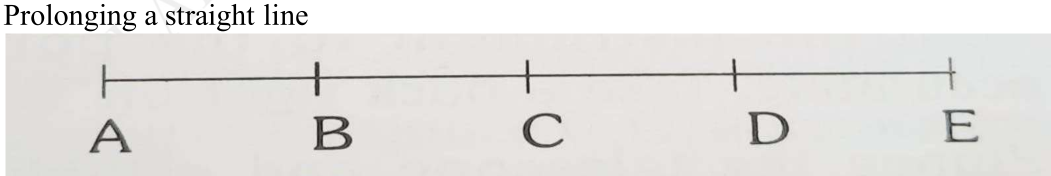
15 **List any four uses of theodolite in surveying. Explain any of the listed uses with the help of sketches.**

- Measure horizontal angle
- Measure vertical angle
- Measure bearing of line
- Prolonging a straight line

2

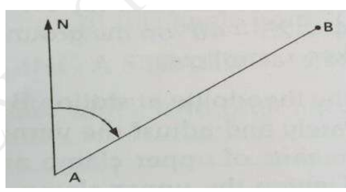
Prolonging a straight line

Pro:4
Fig:1



1. Set up the instrument over A and level it accurately. Clamp the upper clamp.
2. By loosening the lower clamp sight station B. Clamp the lower clamp and bisect B accurately using the lower tangent screw.
3. Establish a point C beyond B in the same line of AB. It is to be noted that in bisecting the ground points only are to be sighted.

	4. Move the instrument to B bisect C accurately using the lower clamp and tangent screws. Establish a point D in line with BC beyond 'C', 5. Continue the above process till the last point E is established,	
16	**Briefly explain the following technical terms 1) Vertical axis 2) Transitting 3) Swinging 4) Telescope normal 5) Telescope inverted** 1) Vertical axis: The vertical axis of the theodolite is the axis about which the instrument rotates in the horizontal plane 2) Transitting: It is the operation of turning the telescope about the horizontal axis in vertical plane through 180 degree. 3) Swinging: It is the operation of turning the telescope about the vertical axis in horizontal plane. 4) Telescope normal: if the vertical circle is on the left side of the obsrever the theodolite is in the face left condition or telescope is in normal position. 5) Telescope inverted: when the telescope is inverted, the eyepiece is facing downward, the objective lens is facing upward.	
17	**State the fundamental lines and their relations if the theodolite is in perfect adjustment** Fundamental lines of transit theodolite (i) The vertical axis. (ii) The axis of the plate levels. (iii) The axis of telescope. (iv) The line of collimation. (v) The horizontal axis. (vi) The axis of the altitude bubble. Following are the relationships between the fundamental lines 1. The axis of the plate level must lie in a plane perpendicular to the vertical angle 2. The line of collimation must be perpendicular to the horizontal axis at its intersection with the vertical axis 3. The horizontal axis must be perpendicular to the vertical axis 4. The axis of the altitude level must be parallel to the line of collimation 5. The vertical circle vernier must read zero 6. The axis of the striding level must be parallel to the horizontal angle	3.5 3.5
18	**Explain the measurement of horizontal angle by reiteration method**	2

	Reiteration method is adopted when several angles are to be measured at a station. The angles are measured in succession and finally horizons closed to check the accuracy of the work. It may be noted that the final reading after closing horizon should be same as the initial reading. Let it be required to measure angles AOB, BOC, and COD The procedure is as follows. 1. The theodolite is set up at o and all the temporary adjustments are made. The reading on vernier A is then adjusted to 0’0’ 0’ and the object 'A' is bisected with the help of lower clamp and lower tangent screw. Lower clamp is then tightened. 2. The upper clamp is then released and the telescope is rotated in horizontal plane in clock wise direction and the next object B is bisected exactly by upper clamp and upper slow motion screw. Both the verniers are then read and the average of these two readings will berequired angle AOB. 4. The above procedure is repeated to bisect the objects C and D in succession and both the verniers are read and the corresponding included angles are worked out. 5. Lastly the horizon is closed by bisecting the same initial object P. The final reading now should be the same as the initial one. 6. If not discrepancy is noted and equally distributed in all angles. If the discrepancy is beyond the permissible limits the above readings are to be deleted and new set of readings are to be taken. 7. With the changed face the whole procedure is repeated and the required angles are obtained. 8. The mean of the above two sets of observations gives required horizontal angles, the readings are entered in a tabular form.	5
19	**Explain how you would measure the magnetic bearing of a line with a theodolite**  1. Set the instrument at P and level it accurately. 2. Set accurately the vernier A to zero 3. Loose the lower clamp. Release the needle of the compass. Rotate the instrument about its outer axis till the magnetic needle roughly points to north. Clamp lower clamp. Using the lower tangent screw, bring the needle exactly against the mark so that it is in magnetic meridian. The line of sight will also be in the magnetic meridian. 4. Loose the upper clamp and point the telescope towards Q. Bisects Q accurately using the upper tangent screw. Read vernier A and B. 5. Change the face and repeat steps 2, 3 and 4. The average of the two will give the correct bearing of the line PQ.	Fig:2

CORSE OUTCOME 2

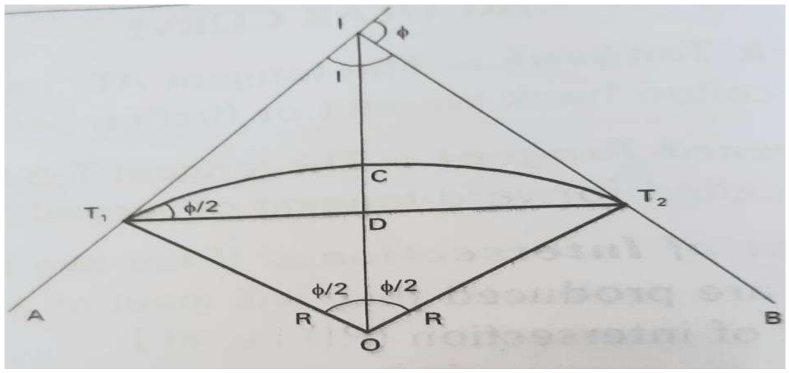
PART A

I. Answer the questions in one word or one sentence. Each question carries one mark.

1	**Give the distance formula in tacheometry when the line of sight is horizontal and staff is held truly vertical.** D= K s+C	1
2	**Latitudes and departures are collectively called as___________co-ordinates** Consecutive coordinates	1
3	**Write the equation for additive constant of a tacheometer** (f + d) =C	1
4	**What is the difference between latitude and departure** Latitude: The latitude of a survey line may be defined as its coordinate length measured parallel to an assumed meridian direction. Departure: The departure of a survey line may be defined as its coordinate length measured perpendicular to an assumed meridian direction.	0.5 0.5
5	**What is a transition curve** A curve whose radius gradually varies from infinity to finite value equal to the radius of circular curve to be connected is known as transition curve.	1
6	**Write the transit rule to balance a traverse** Error in latitude or departure = $\frac{Total\ error\ in\ latitude\ or\ departure}{Arithmetic\ sum\ of\ all\ latitude\ or\ departue}\ x\ Numerial\ value\ of\ latitude\ or\ departure$	1
7	**What is a mid ordinate of a curve** The ordinate joining the midpoint of the curve and long chord of the curve.	1
8	**What do you understand by omitted measurements?** While conducting theodolite traverse, some of the readings (such as lengths and angles) are forgotten to read or not down or missed due to any other reasons. Such readings are called omitted measurements.	1
9	**What are the objects of tachometric survey?** Preparation of contour map Location surveys for railways, canals, reservoirs…	1
10	**Mention various methods of setting out a simple curve?** By taking offsets or ordinates from the long chord By taking radial offsets from tangents By taking perpendicular offsets from tangents By offsets from chord produced.	1

PART B

II. Each question carries <u>three</u> marks.

11	**Explain the components of a simple curve with neat sketches**  Point of Intersection (PI) The point of intersection marks the point where the back and forward tangents intersect. The surveyor indicates it as one of the stations on the preliminary traverse. Intersecting Angle (I) The intersecting angle is the deflection angle at the PI. The surveyor either computes its value from the preliminary traverse station angles or measures it in the field. Radius (R) The radius is the radius of the circle of which the curve is an arc. Point of Curvature (PC) The point of curvature is the point where the circular curve begins. The back tangent is tangent to the curve at this point. Point of Tangency (PT) The point of tangency is the end of the curve. The forward tangent is tangent to the curve at this point. Length of Curve (L) The length of curve is the distance from the PC to the PT measured along the curve. Tangent Distance (T) The tangent distance is the distance along the tangents from the PI to the PC or PT. These distances are equal on a simple curve. Central Angle (Δ) The central angle is the angle formed by two radii drawn from the center of the circle (0) to the PC and PT. The central angle is equal in value to the I angle. Long Chord (LC) The long chord is the chord from the PC to the PT. External Distance (E) The external distance is the distance from the PI to the midpoint of the curve. The external distance bisects the interior angle at the PI. Middle Ordinate (M) The middle ordinate is the distance from the midpoint of the curve to the midpoint of the long chord. The extension of the middle ordinate bisects the central angle.	Any 3
12	**In a quadrilateral ABCD, the coordinates of the points are as follows**	

POINTS	EASTING	NORTHING
A	**0**	**0**
B	**0**	**-893.8**
C	**634.8**	**728.8**
D	**1068.4**	**699.3**

Find the area.

0	0	634.8	1068.4
0	893.8	728.8	699.3

Area = ½ *[(0*893.8)+(0*728.8) + (634.8*699.3) + (1068.4* 0)] – [(0*0)+(893.8*634.8)+(728.8*1068.4)+(699.3*0)]

=116324.98m^2

3

PART C

II. Each question carries <u>seven</u> marks.

13	**Two straights intersect at chainage 2500m and the angle of intersection is 120 the radius of the simple curve to be introduced is 600m, find the following. (i) Tangent distance (ii) Chainage of point of commencement (iii) Chainage of point of tangency (iv) Length of long chord** Deflection angle = 180-12 = 60 1) tangent distance = R tan (θ/2) = 600 tan (60/2) = 346.41 m 2) Chainage of point of commencement = chainage of point of intersection – tangent length = 2500- 346.41 = 2153.59 m 3) Chainage of point of tangency = Chainage of point of commencement + length of curve Length of curve = θπr/180 = 60x π x 600/ 180 = 628.32m Chainage of point of tangency = 2153.59 + 628.32 =2781.91m 4) Length of long chord = 2R sin θ/2 = 2x 600 x sin 30 = 600m	
14	**A theodolite was set up at a distance of 200m from a tower. The angle of elevations to the top of the tower was 8˚18' while angle of depression was 2˚24'. The staff reading on the BM of RL 248.362 with the telescope horizontal was 1.286m. Find the height of the tower and RL of the top of the tower.** Height of the tower above instrument axis= D tan θ = 200 tan 8˚18'= 29.177 m Vertical distance of the foot from instrument axis = D tan θ = 200 tan 2˚24'= 8.382 m Height of tower=29.2+8.4=37.559m RL of the instrument axis=248.362+1.286=249.648 RL of the top of tower=249.648+29.177=278.825m	 1.5 1.5 1.5 1.5 1

15 The following are the consecutive co-ordinates of a closed theodolite traverse ABCDA:

Station	northing	southing	easting	westing
A	300.75		-	200.50
B	200.25		299.25	
C		299.00	199.75	
D		200.00	-	300.50

Calculate

1. The magnitude and direction of closing error.
2. Corrected consecutive co-ordinates of station B. Use transit rule.
3. Independent co-ordinates of station B, if those of A is (100,100)

$\Sigma L = 0$

$\Sigma L = 300.75 + 200.25 - 299 - 200$

$= +2 = e_y$

$\Sigma D = 0$

$\Sigma D = 299.25 + 199.75 - 200.50 - 300.50$

$= -2 = e_x$

Closing error $= \sqrt{\Sigma L^2 + \Sigma D^2}$

$= \sqrt{+2^2 + (-2)^2}$

$= 2.828$ m

$\tan\theta = \frac{\Sigma D}{\Sigma L} = \frac{-2}{+2} = 1$

$\theta = 45$ or -45 (The line lies in 4th quadr

WCB $= 360° - 45° = 315°$

Adjustment by transit rule.

Arithmetic sum of latitude

$= 300.75 + 200.25 + 299 + 200$

$= 1000$

1

correction of latitude of AB

$$= \frac{200.25}{1000} \times 2 = 0.40$$

Correction $= -0.40$

Correction of departure of AB

$$= \frac{299.25}{1000} \times 2 = 0.60$$

Correction $= +.60$

$\therefore$ Corrected latitude of AB

$= 200.25 - 0.40 = \underline{\underline{199.85}}$

Corrected departure of AB

$= 299.25 + 0.60 = \underline{\underline{299.85}}$ 3

Independent co-ordinate of A $= (100, 100)$

Independent co-ordinate of B

$= 100 + 299.85 = \underline{\underline{399.85}}$

$= 100 + 199.85 = \underline{\underline{299.85}}$

3

COURSE OUTCOME 3

PART A

I. Answer the questions in one word or one sentence. Each question carries one mark.

1	**Name any two EDM instruments** Geodimeter, Tellurimeter	1
2	**A total station is a combination of …… and …...** Electronic theodolite and EDM	1
3	**Name any one EDM instrument** Geodimeter, Tellurimeter	1
4	**Electronic theodolites are used for__________measurement** Angular	1

PART B

II. Each question carries three marks.

5	**Explain the working principle of any one Electronic Distance Measuring instrument.** Geodimeter: Geodimeters work by sending a light signal of known wavelength to a reflector. The wavelength of the returning signal is compared to the outgoing one, and the difference (called the "phase shift") is measured.	3
6	**List any six advantages of total station** • Quick collection of information. • Multiple surveys can be performed at one set up location. • Easy to perform distance & horizontal measurements. • Layout of construction site quickly and efficiently. • Digital design data from CAD programs can be uploaded to data collector. • Daily survey information can also be quirky downloaded into CAD. Which eliminatesdata manipulation time required using conventional survey techniques.	6x 0.5
7	**Explain the working principle of Total station.** Given the co-ordinate of the instrument position and bearing of a backward station the co-ordinates of any other point can be computed	3
8	**Explain the different sources of error in total station data** • Circle Eccentricity • Horizontal Collimation • Height of Standards • Error in Total Station	3X 1
9	**Explain prism mode and non-prism mode in total station** In prism mode reflectors are used In non prism mode reflector is not used	1.5 1.5

PART C

III. Each question carries seven marks.

10	**Write in brief, the steps involved in traversing with a total station.** 1. Fix the total station over a station and level it 2. Press the power button 3. Select MODE B name) ------- >accept 4. Then press ESC to go to the starting page 5. Then set zero by double clicking on 0 set(F3) 6. Then go to S function --- > measure-----> rectangular co-ordinate ----> station ---- > press enter 7. Here enter the point number or name, instrument height and prism code. 9. Keep the reflecting prism on the first point and turn the total station to the prism ,focus it andbisect it exactly using a horizontal and vertical clamps. 10. Then select MEAS and the display panel will show the point specification 11. Now select edit and re-enter the point number or name point code and enter the prismheight that we have set. 12. Then press MEAS/SAVE (F3) so that the measurement to the first point will automaticallybe saved and the display panel will show the second point. 13. Then turn the total station to second point and do the same procedure. 14. Repeat the steps to the rest of the stations and close the traverse 15. Now go to S function----> view/edit --- graphical view. 16. It will show the graphical view of the traverse	7
11	**Explain the temporary adjustments in total station setup** 1. Centering the Total station over the station. 2. Levelling the Total station. 3.Elimination of parallax **1. Centering the Total station over the station.** This includes the Centering of the Total station over the ground mark and also approximate levelling with the help of Tripod legs. While centering, it is necessary to ensure the approximate levelness; otherwise the centering will be disturbed when subsequent Levelling of the instrument is done. It can be done either using a plum-bob or laser plummet. **2. Levelling the Total station** Accurate Levelling is done with the help of plate levels using levelling screws.Here the Verticalaxis (plumb line) of the Total station is made truly vertical.	7

	• Align the bubble parallel to two foot screws and bring to the center by turning the bothscrews same direction. • Align the bubble with the remaining foot screw (turn 90o) and bring to the center by		

	rotating it • Repeat the process till the bubble remains centered in any direction. Principle ofreversibility 3. **Elimination of parallax.** It is done by focusing the eye piece for distinct vision of cross hairs and focusing the object to bring the image of the object in the plane of cross hairs. Accurate bisection and sighting is difficult when there is Parallax. Hold a white paper in front of the objective or sight the telescope towards the sky. Move the eye piece in or out till the cross hairs are seen sharp and distinct.It can be check by moving the eye slowly to one side. If there is no parallax the image and the cross hairs will appears still.	
12	**Describe steps in traversing using a total station.** 1. Fix the total station over a station and level it 2. Press the power button 3. Select MODE B name)------- >accept 4. Then press ESC to go to the starting page 5. Then set zero by double clicking on 0 set(F3) 6. Then go to S function --- > measure-----> rectangular co-ordinate ----> station ---- > press enter 7. Here enter the point number or name, instrument height and prism code. 9. Keep the reflecting prism on the first point and turn the total station to the prism, focus it andbisect it exactly using horizontal and vertical clamps. 10. Then select MEAS and the display panel will show the point specification 11. Now select edit and re-enter the point number or name point code and enter the prismheight that we have set. 12. Then press MEAS/SAVE (F3) so that the measurement to the first point will automaticallybe saved and the display panel will show the second point. 13. Then turn the total station to second point and do the same procedure. 14. Repeat the steps to the rest of the stations and close the traverse 15. Now go to S function----> view/edit ---graphical view. 16. It will show the graphical view of the traverse	7
13	**Describe data gathering and data processing in a total station.** When target is sighted, horizontal and vertical angles as well as sloping distances are measured and by pressing appropriate keys they are recorded along with point number. Heights of instrument and targets can be keyed in after measuring them with tapes. Then processor computes various information about the point and displays on screen. This instrument is provided with an inbuilt microprocessor. The microprocessor averages multiple observations. With the help of slope distance and vertical and horizontal angles measured, when height of axis of instrument and targets are supplied, the microprocessor computes the horizontal	7s

	distance and X, Y, Z coordinates. The processor is capable of applying temperature and pressure corrections to the measurements, if atmospheric temperature and pressures are supplied. At the end of the day the information stored is downloaded to computers. The point data downloaded to the computer can be used for further processing. There is software like autocivil and auto plotter clubbed with Auto Cad which can be used for plotting contours at any specified interval and for plotting cross section along any specified line.	

COURSE OUTCOME 4

PART A

I. Answer the questions in one word or one sentence. Each question carries one mark.

1	**Name the three spatial data models in GIS** Cartesian (x,y) coordinates Topological format(nodes, links, polygons) Raster format (grids)	1
2	**Expand GNSS** Global Navigation Satellite System	1
3	**Name one GIS software** ArcGis	1
4	**Acquisition of information about an object or phenomenon without making physical contact with the object.** Remote sensing	1
5	**State the principle behind the distance measurement using a total station** Laser transmission and receiving: Laser is emitted and strikes a target usually a prism and it is received and interpreted as distance.	1
6	**Differentiate between aerial and terrestrial photogrammetry** Aerial photogrammetry: It is a branch of photogrammetry. Where the photographs are taken by a camera mounted on aircraft flying over the area. Terrestrial photogrammetry: It is a branch of photogrammetry. Where the photographs are taken from a fixed position on or near the ground.	1

PART B

II. Each question carries three marks.

7	**List the four types of map projections** 1. Vertical photograph 2. Oblique photograph 3. Convergent photograph 4. Trimetragon photograph	3
8	**List any six applications of remote sensing in civil engineering** **1**.Environmental Planning • Providing effective analysis and modelling tools for an environment impact assessment. • Air/water quality modelling and monitoring,. • Ground water movement modelling. • Environmental hazard identification & evaluation. • Coastal management. • Waste disposal site locations.	6x0.5

	• Floods zone mapping. 2. Local and municipal authorities • Land use inventory and planning. • Growth monitoring. • Cadastral and parcel mapping. • Census mapping and community development. • Planning and zoning. • Tax records management. • Engineering analysis - Cross section elevation measurements. 3. Transport planning • Fleet monitoring and navigation. • Corridor analysis drainage and water shed management. • Highway design and customisation. • Routing optimisation and demand modelling. • Analysis of accident prone areas. • Analysis of road sections vulnerable to landslides, floods etc. 4. Public utilities. • Modelling communication and distribution network. (Eg. Electric power, Telephone, gas, water and sewer lines). • Asset inventory and management. • Recreation and parks management	
9	**Enumerate the components of GPS receiver.** There are three segments of G.P.S 1. Space 2. Control 3.User The space segment: The space segment consists of 24 satellites including three active spares. The satellites are placed in near circular orbits in six orbital planes with an orbital inclination at 55 degree and at 20,200 km above the earth. Control Segment: The control segment consists of a master control station in colorado springs, colorado with five monitor stations and three controls up link stations located throughout the world. User segment: Appropriate G.PS receivers are required to use G.PS signals for navigation and positioning. The user segment consists of the receiver's processors and antennas that allow land, sea or airborne operators to receive the G.PS satellite broadcasts and compute their precise position, velocity and time.	3
10	**Differentiate between aerial and terrestrial photogrammetry** a) Aerial photogrammetry requires a high-end infra support Terrestrial photogrammetry comparatively needs much less investment and technical skill to carry out. b) The aerial kind of photogrammetry is suitable when we are trying to map a large piece of land. That is longitudinal knowledge and calculations are an integral part of this	

	photogrammetry operation. Terrestrial photogrammetry is a preferred method when designers and planners aim to monitor and map bridges, pipeline networks, transport network, etc. The axis of the camera takes care of the area surface to be covered. c) Security processes benefit from aerial photogrammetry in many cases. Finding archaeological sites also benefits from the fact that we get to see a large piece of land at one go. Terrestrial photogrammetry is more suitable for movement related issues on a land mass that is relatively smaller than that covered in the other kind. d) Urban planning takes advantage of both the methods. Using aerial photogrammetry, planners and designers collaborate on the best possible perspective for a specific project. An aerial view of the proposed project along with its surroundings helps to generate a clear idea about the right perspective. Terrestrial photogrammetry, on the other hand, helps to see the interrelation between urban constructions, security issues, disaster management and many other issues benefit from this kind of analysis.	
11	**List the advantages of GPS survey over conventional surveying** • The GPS signal is available anywhere on the globe. Hence user will not deprive of GPS facility anywhere. • There is no charge to utilize the GPS service as US Defence bears cost of GPS system. It is maintained and upgraded by US Department of Defence. • It is cheaper compare to other navigational systems. • The GPS system gets calibrated by its own and hence it is easy to be used by anyone. • It provides user with location based information. • This will be helpful in various applications such as mapping (used in cars), location (geocaching), performance analysis (used in sports), GIS etc	3
12	**Explain GNSS.** GNSS stands for Global Navigation Satellite System, and is the standard generic term for satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. This term includes e.g. the GPS, GLONASS, Galileo, Beidou and other regional systems.	3
13	**State shortly on the following methods of map projections.** **a) Equal area projection b)Conformal projection c)Equidistant projection** a) Equal area projection: This projection preserve area All thematic maps should use an equal area projection. Cylindrical and sinusoidal equal area method is the common projection method used. b) Conformal projection method This projection preserves angles. Useful for navigational chars and weather maps. While mapping large area are distorted and small area are preserved. Lambert conformal conic projections and Mercator projections are commonly used conformal projections. c) Equidistant projections: Preserve distances, but not all distances can be preserved.	 1 1

	There will be some type of distortions. All the points on the map are at the correct azimuth from the centre point.	1

PART C

II. Each question carries <u>seven</u> marks.

14	**Explain the components of remote sensing.** • There are four basic components of a remote sensing include a target an energy sources, a transmission path and a sensor. • The target is the object or material that is being studied. • The components in the system measure and record information about the targetwithout actually coming into physical contact. • There must also be an energy source which illuminates or provides electromagnetic energy and will act as a medium for transmitting information from the target to the sensor. • The sensor of remote device that will collect and record the electromagnetic radiation. • Once the energy has been recorded, the resulting set of data must be transmitted to a remote where the data are processed into usable format which is most often as an image. • The image interpreted in order to extract information about the target. • This interpretation can be done electronically with the aid of computers and image processing software.	7
15	**Explain the three segments in GPS** There are three segments of G.P.S 1. Space 2. Control 3.User **The space segment:** The space segment consists of 24 satellites including three active spares. The satellites are placed in near circular orbits in six orbital planes with an orbital inclination at 55 degree and at 20,200 km above the earth. **Control Segment:** The control segment consists of a master control station in colorado springs, colorado with five monitor stations and three controls up link stations located throughout the world. Monitor stations track all G.P.S satellites in view and collect ranging information from the satellite broadcasts. The monitor stations send information they Collect from each of the satellites back to the master control station which computes extremely precise satellite orbits. The information is then formatted into updated navigation message for each satellite. The updated information is transmitted to each satellite the control up link stations which also transmit and receive satellite control and monitoring signals. **User segment:** Appropriate G.PS receivers are required to use G.PS signals for navigation and positioning. The user segment consists of the receiver's processors and antennas that allow land, sea or airborne operators to receive the G.PS satellite broadcasts and compute their precise position, velocity and time.	7

16	**Explain the applications of GIS in Civil Engineering** • Structural Engineering. • Transportation • Terrain Mapping and Analysis. • Watershed Analysis. • Environmental Engineering • Impact Studies. • Wastewater and Storm water Management • Disaster Management.	7x1
17	**Explain remote sensing and list its applications**. Remote sensing may be defined as art and science of gathering the information about objects,occurrence or area without having physical contact with it. There are various applications of remote sensing which may be grouped into the following: 1. Resource Exploration 2. Environmental Study 3. Land use 4. Site Investigation 5. Archaeological Investigation and 6. Natural Hazards Study	2 5x1
18	**What are the components of GPS receivers?** (i) Antennas with preamplifier (ii) RF section with signal identification and signalprocessing (iii) Microprocessor for receiver control data sampling,data processing (iv) Precision oscillator (v) Power supply (vi) User interface, command & display panel.	7
19	**Enumerate the advantages of GPS over conventional terrestrial surveying.** 1. Intervisibility between stations or points surveyed is not necessary. This allowscontrol stations to be placed conveniently. 2. GPS can be used in any weather condition (day or night) 3. Very easy to use 4. Simple operations or use without any complex or technical steps 5. Give quick results 6. Produce results with very high geodetic accuracy 7. More work can be accomplished in less time with less man power 8. Limited calculation and tabulation work required 9. Large area can be surveyed in short duration 10. Network independent site selection is used; hence sites can be placed where needed. 11. Three dimensional coordinates obtained.	7