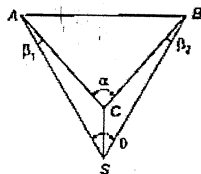


## Triangulation

- Q.1 Satellite station  $S$  is established during a triangulation survey as shown in figure



The angle  $\alpha$  is equal to

- (a)  $\theta + \beta_1 + \beta_2$  (b)  $\theta - \beta_1 + \beta_2$   
 (c)  $\theta + \beta_1 - \beta_2$  (d)  $\theta - \beta_1 - \beta_2$
- Q.2 The number of independent conditions required to be satisfied for the adjustment of a braced quadrilateral in triangulation survey is
- (a) 2 (b) 4  
 (c) 6 (d) 8
- Q.3 Consider the following statements associated with triangulation survey
1. In triangulation survey, unknown distances between stations are determined using tacheometric relations.
  2. The triangulation station at which astronomical observations are made for azimuths are called Laplace stations
  3. In tertiary triangulation, the length of the sides are in the range of 10 to 25 km
  4. The length of the base line in primary triangulation is 8 to 12 km
- Of the above statements
- (a) 1 and 2 are correct  
 (b) 3 and 4 are correct  
 (c) 1 and 4 are correct  
 (d) 2 and 4 are correct

- Q.4 Pick up the incorrect statement from the following. In a spherical triangle
- (a) every angle is less than two right angles  
 (b) sum of the three angles is equal to two right angles  
 (c) sum of the three angles is less than six right angles and greater than two right angles  
 (d) if the sum of any two sides is  $\pi$ , the sum of the angles opposite to them is also  $\pi$
- Q.5 According to Napier's Rules of circular parts for a right angled triangle, sine of middle part equals the product of
- (a) tangents of the two adjacent parts  
 (b) cosines of the two adjacent parts  
 (c) cosines of the two opposite parts  
 (d) both (a) and (c) above
- Q.6 If  $E$  is the spherical excess and  $R$  is the radius of the earth, the surface area of the triangle, is
- (a)  $\frac{\pi R^2 E}{90^\circ}$  (b)  $\frac{\pi R^2 E}{180^\circ}$   
 (c)  $\frac{\pi R^2 E}{270^\circ}$  (d)  $\frac{\pi R^2 E}{360^\circ}$
- Q.7 If  $S$  is the sum of three angles of a spherical triangle, the spherical excess equals
- (a)  $S - 90^\circ$  (b)  $S - 180^\circ$   
 (c)  $S - 270^\circ$  (d)  $S - 360^\circ$
- Q.8 In triangulation, the best shape of the triangle would be
- (a) the equilateral triangle  
 (b) right angled isosceles triangle  
 (c) isosceles with two base angles of  $56^\circ 14'$  each  
 (d) isosceles with two base angles of  $65^\circ 14'$  each
- Q.9 Match List-I with List-II and select the correct answer using the codes given below the lists;

#### List-I

- A. Adjustment of surveying instruments
- B. Bowditch rule
- C. Triangulation
- D. Bessel's method

#### List-II

- 1. Bringing the various fixed parts of the instrument into proper relation with one another
- 2. Solution of three-point problem
- 3. Measuring all the angles and the base line
- 4. Balancing the latitudes and departures of traverse

#### Codes:

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 1 | 2 | 3 | 4 |
| (b) | 2 | 1 | 4 | 3 |
| (c) | 1 | 4 | 3 | 2 |
| (d) | 3 | 2 | 1 | 4 |

- Q.10 A and B are triangulation stations 100 km apart. If the height of station A above the level surface passing through the mean level of intervening ground is 11 m, then the distances of A and B from the visible horizon will be respectively
- (a) 3040 km and 6960 km
  - (b) 59.60 km and 40.40 km
  - (c) 40.40 km and 59.60 km
  - (d) 69.60 km and 30.40 km

- Q.11 The station which is selected close to the main triangulation station to avoid intervening obstruction is known as
- (a) Satellite station
  - (b) False station
  - (c) Supplementary station
  - (d) Pivot station

- Q.12 In triangulation, the network figure is a braced quadrilateral. If all the stations have been occupied and all the lines have been observed in both the directions, then the factor for the strength of fix will be
- (a) 0.75
  - (b) 0.56
  - (c) 1.64
  - (d) 0.60

- Q.13 Log-sine formula is used in triangulation to check:
- (a) Apex Condition
  - (b) Angle Condition
  - (c) Side Condition
  - (d) All of the above

- Q.14 In triangulation, the best shape of triangle is isosceles with base angles equal to:
- (a)  $60^\circ 14'$
  - (b)  $58^\circ 14'$
  - (c)  $56^\circ 14'$
  - (d)  $60^\circ 00'$

- Q.15 The curvature of the earth surface is taken into account only if extent of survey is more than
- (a)  $100 \text{ km}^2$
  - (b)  $160 \text{ km}^2$
  - (c)  $200 \text{ km}^2$
  - (d)  $260 \text{ km}^2$

#### Answers Triangulation

1. (a) 2. (c) 3. (b) 4. (b) 5. (d) 6. (b) 7. (b) 8. (c) 9. (c) 10. (D)  
11. (a) 12. (a) 13. (c) 14. (c) 15. (d)

#### Explanations Triangulation

4. (b)  
Properties of spherical triangle  
(i) Any angle  $< \pi$   
(ii)  $2\pi < \text{Sum of angles} < 2\pi$   
(iii) Sum of two sides is greater than the third  
(iv) If sum of two sides =  $\pi$  then sum of angles opposite them =  $\pi$
5. (d)  
NAPIER'S RULE  
Sine of middle part = product of tangent of adjacents.  
Sine of middle part = product of cosines of opposites

11. (a)  
To have intervisibility of stations and to achieve well conditioned triangles, some times high objects like church spires, towers, etc. are selected as triangular stations. It becomes impossible to set the instrument over such stations for lack of sufficient space. In such cases, some nearby stations, called satellite stations, are fixed and all observations are made from it.