7475 SPECIAL TECHNIQUES

(PAPER TWO) C

Part one

1. Define
    a **GPS:** Is a satellite base navigation system made up of a network of 24 satellites placed at high altitudes (about 2200km) into six précised orbital laces.
    b **Geodetic coordinates**: A location on the earth is defined by its latitude, longitude and elevation
    c **Direct stereo effect**: During stereoscopic measurements, instead of a piece of land stereoscopically, we observed two of its aerial photographs. As a result, there arise a stereoscope effect; that is the observer sees a stereoscopic or geometrical (3-D) model of the terrain where valleys are seen as valleys and summits seen as summits
    d **Stereo model**: It's the three dimensional model of the terrain.
    e **Mapping:** is a technical field which embraces the study and compilation and utilization of cartographic products
    f **Map revision:** is the renewal of a topographic map after being established. That is the look of the earth changes due to human activities like construction of roads, building etc. The plan drawn for such regions needs updating.
2. Geocentric latitude of a point is the angle it makes with the equatorial plane while
   Geocentric latitude of a point is the angle made between the equatorial plane and perpendicular from that point to the surface at the datum
3. Binocular vision is vision with two eyes (Sighting with two eyes) distant object is seen as in monocular vision. When observing with two eyes, objects that are closer to each other

While

In stereoscopic vision, sighting is done with two eyes but it does not perceived very high accuracy in measurements on non-contour points

4. The instrument used to establish stereo model is the stereoscope.

5. a. Rectification of photographs is the transformation of perspective inclined to vertical or horizontal photographs.

   b.

   - ❖ Photo mechanical method
   - ❖ Analytic method
   - ❖ Graphical method.

c. The importance of rectification is to clear all tilt distortions which will permits the photographs to be used for planning of work or project and could ne annotated similarly to maps with borders and legends to become photo map

6. a.

   i. Triangulation
   ii. Polygonommetry
   iii. Trilateration

   b.

   i. The mapping of a territory in different scales in a unit system of coordinates.
   ii. The detailed study of the figure and the gravitational pole of the earth
   iii. For solutions of geodetic problems

7. a.

- ❖ Aerial photography: in this method, the camera is meant in an aircraft and is usually pointed vertically towards the ground. Multiple overlapping photos of the ground are taken as the aircraft flies along a flight path.
- ❖ Terrestrial photography:- in this method, the camera is closed to the subject and is typically hand held or on tripods. The output is in 3-D model from a stereo pair.

b.

- ❖ It increase the labour productivity of the field work
- ❖ It eliminate the need of staff men
- ❖ It provide a large choice of points
- ❖ It involve all visible objects

c.

- ❖ Civil engineering
- ❖ Used in the survey of quarries.
- ❖ In engineering works in high mountainous regions in combination with aerial photo survey

PART TWO: NUMERICAL APPLICATION AND ANALYIS

Solution 1.

$F=\frac{a-b}{a}=\frac{6378137-6356752.314}{6378137}$

F= 0.00335281

$e^2=\frac{a^2-b^2}{a^2}=\frac{(6378137)^2-(6356752.314)^2}{6378137^2}$

e^2 = 0.00669438

$e^{-2}=\frac{a^2-b^2}{b^2}=\frac{(6378137)^2-(6356752.314)^2}{(6356752.314)^2}$

c^{-2} = 0.006739496

Solution 2.

a. $1/S = F/H$ =H= SF= 24000 x 152mm

=3648m

b. Air base Bx

bx = L(100-px)/100 =18cm (100-60%) /100=**7.2cm**

On land Bx = bx.S=7.2cm x 24000

=1728m

c. The area of one photograph is

L=l x s=18(240) =**4320m**

Surface area covered by each photographs is

L x l =4320x4320= **18662400m^2**

Distance covered by 60% overlap is

60% x l =60/100x 4320 =**2592m**

d. Area common to a stereo pair

4320 x 2592=**11197440m^2**

Solution 3

a. tan g = h/d. g= $^{+}$**0.024**

b. 0.024 x 100 =+ **2.4%**

c. v=tan^{-1} 0.024 =**1.4^0**

d. 1/n = **1/40.91**