University Of Technology
Building and Construction Eng. Dept.
Final Exam–2014/2015- First Attempt
Subject : Cartography (2)
Class: 2nd year Time : 3 Hours
Date : 25/5/2016
Note: (8) Eight Questions Only

1) Find the suitable standard scale to plot (818 m ,1012 m) two times on a paper (70 cm x 100 cm), neglect 2 cm from each side of paper, then find the dimensions of the area on a chosen scale.
2) Find the values of convergence of map scale 1/50000 for all corners and center if the geographic coordinates of SW corner are:

$$\phi = 28^o17'27'' , \lambda = 49^o45'30''$$

3) List methods of changing scale of maps and give a numerical example for each method (Draw each case).
4) Find the distance of object and image from photographic lens its focal length =150 mm, if the ratio of enlargement $\left(\frac{u}{v} = \frac{7}{5}\right)$.
5) Define and explain uses of: screen, negative and positive images, map projection, cartographic accuracy.
6) List kinds of coordinates systems on topographic maps and explain each one, then draw the relationship between them on UTM Zone (Draw the case).
7) List method of representation relief and explain two methods with drawings.
8) Show by drawing the geographic dimensions and the number of map of each map below, that lays on topographic map 1/250000:

1/100000, 1/50000, 1/25000

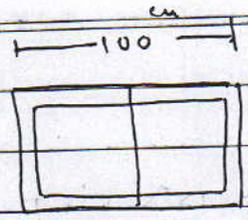
9) Compute the accuracy values of maps scale:

1/20000, 1/5000, 1/2500

10) Show the main formula of conformal projection and explain the condition of conformality.

Good luck

(Solutions)



Q.) $100 - 4 = 96$ cm

$70 - 4 = 66$ cm

$\frac{96}{2} = 48$ cm

$\frac{66}{2} = 33$ cm

$\therefore S_1 = \frac{48}{1012 * 100} = \frac{1}{2108}$

$S_2 = \frac{33}{818 * 100} = \frac{1}{2478}$

we choose the lower (smaller scale) value which is $\frac{1}{2478}$

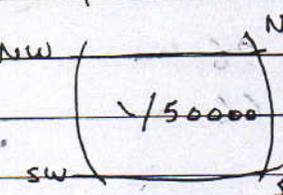
then we take a standard scale $\Rightarrow \frac{1}{2500}$

$\therefore \frac{1}{2500} * 101200 = 40.48$ cm

$\frac{1}{2500} * 81800 = 32.72$ cm

} The new dimensions of land in a chosen standard scale

15'



(D2)

$\delta_{SW} = D\lambda \sin\varphi =$

$= (5' - 4^\circ\ 45'\ 30'') \times \sin 28^\circ\ 17'\ 27'' = 0^\circ\ 35'\ 18.54''$

$\delta_{NW} = (5' - 4^\circ\ 45'\ 30'') \times \sin 28^\circ\ 32'\ 27'' = 0^\circ\ 35'\ 35.7''$

$\delta_{SE} = (5' - (4^\circ\ 45'\ 30'' + 15')) \times \sin 28^\circ\ 17'\ 27'' = 0^\circ\ 28'\ 11.99''$

$\delta_{NE} = (5' - (4^\circ\ 45'\ 30'' + 15')) \times \sin (28^\circ\ 17'\ 27'' + 15') = 0^\circ\ 28'\ 25.69''$

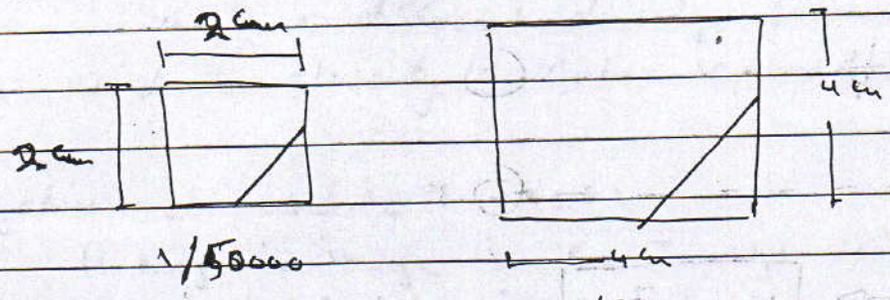
$\delta_{Center} = (5' - (4^\circ\ 45'\ 30'' + 0^\circ\ 7'\ 30'')) \times \sin (28^\circ\ 17'\ 27'' + 0^\circ\ 7'\ 30'')$

$= 0^\circ\ 31'\ 52.99''$

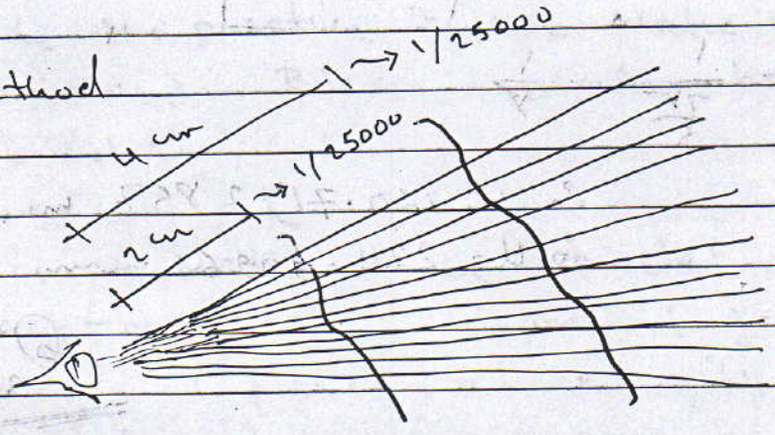
CP

(Q3) The main methods of changing scale are

1) square method:



2) Triangle method



3) photographic method: using Newton law of photography

$$\frac{1}{F} = \frac{1}{u} + \frac{1}{V}$$

where F: Focal length

u: the distant between object and lense

V = the distant between Image and lense

$\frac{U}{V}$ = Enlargment ration

$\frac{V}{u}$ = shortage ratio

(24)

$$\frac{1}{F} = \frac{1}{u} + \frac{1}{v}$$

$$\frac{1}{150} = \frac{1}{u} + \frac{1}{v} \quad \text{------- (1)}$$

$$\frac{u}{v} = \frac{7}{5} \quad \text{------- (2)}$$

$5u = 7v \Rightarrow \boxed{u = \frac{7}{5}v}$ .... substitute in eq (1)

$$\frac{1}{150} = \frac{1}{\frac{7v}{5}} + \frac{1}{v}$$

$\therefore v = 160.7142857$ mm

$\therefore u = 224.9996$ mm

(Q5)

* screen: is a layers of dots makes by a certain angles and a diffrent density from 10% to 90%. it is used to classify a color seperation

* negativ and posetive Images:
A Negativ image is an Image which shows all features in a white and the background in Black while the posetive Image make it is (the features) in Black and the background in white color

* Map projection: is a Mathematical model of equations used to represent geographic net in a plane surface with min distortion in (distand, area, angles) which depends on a kind of map projection

* Cartographic accuracy: Cartographic accuracy is the ratio between a projected distance on a representative earth (globe) to the true radius of the earth (6371.1 km)

$$\frac{r}{R} = \frac{x}{\Delta h}$$

Wher $\Delta h = 21$ km (the distant between Everest and the lower point on earth in Mexico)

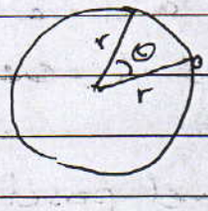
$$\therefore x = 0.02 \text{ mm}$$

6)

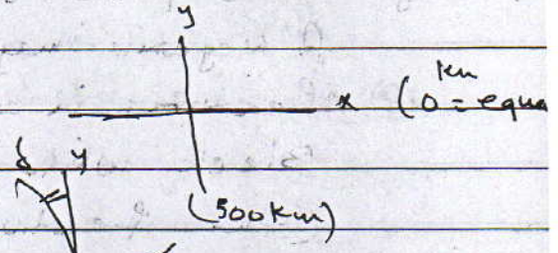
~~The main kinds of Coord. Sys. are~~

1) The polar Coord. sys. (Does not use in topographic maps)

The position on earth surface = $r\theta$

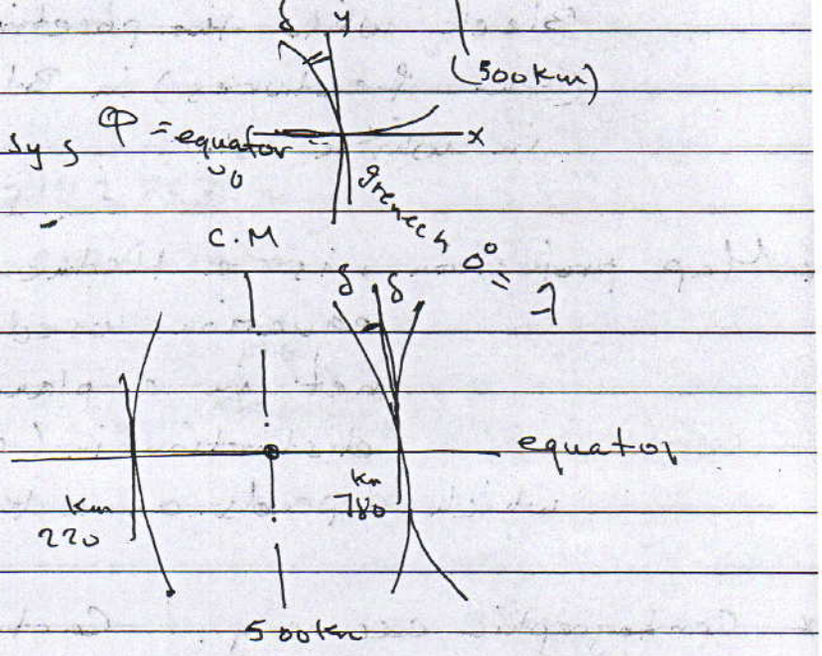


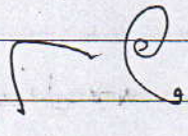
2) rectangular Coord sys (x, y)



3) Geographic Coord sys

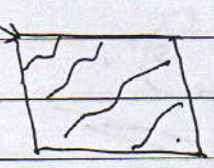
$\delta = \Delta\lambda \sin\theta$



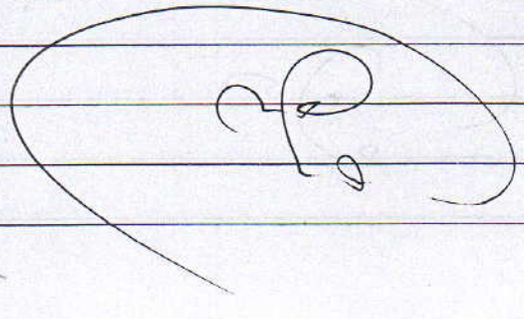


7) 1) Contour lines
2) color seperation [color squares]
3) shadow method
4) stereo maps [panorama models]
5) E.D.M method
6) Anglef maps
7) Hucherring method

1) shadow method: is to plote light by an angle 45° as in figer and (sun) the cartographer make shadding the Contour lines so, the areas feeing light (sun) be bright with difrent degrees and the areas in dark has been shaded in diffrent degress then we cimikdy eleminate Contour lines and which stay is the shadow only its used in small scale maps which loaded ~~info~~ infomation maps.

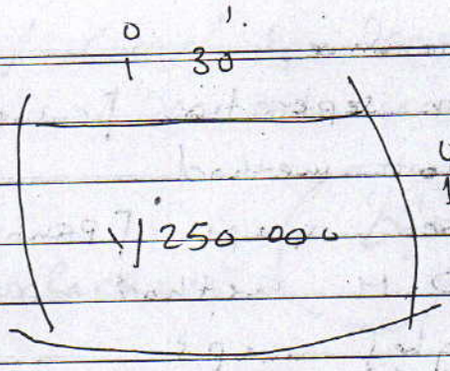


2) Anglef Maps: the base of this method depends on photographing certain area by deffement scales and use red color in one and green color in another, then make printing two times and Matching the first print with the second, then use a special gleses has two color (Red, Green) to make relief effect and stres to recognize features it's a panorama method

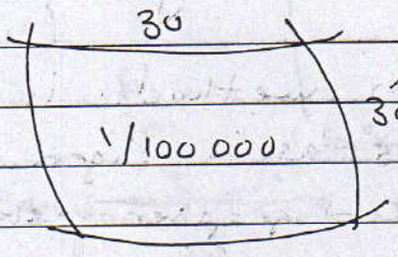


8)

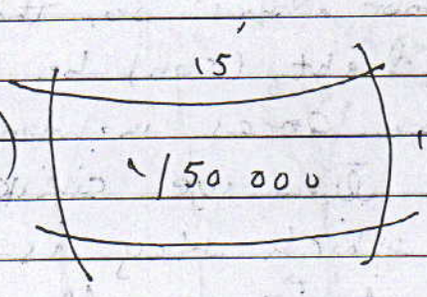
(1 8)



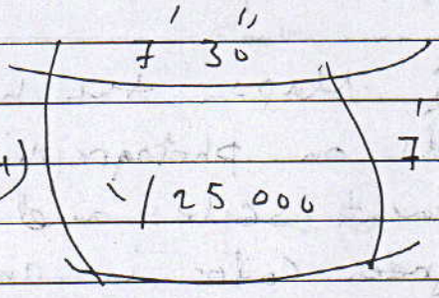
the number = 6 (2*3)



the number: 16 (4*4)



the number = 64 (16*4)



(9) The accuracy Values :-

1/20 000 using 0.2^{mm} $\Rightarrow$ Cartograph accuracy $= 4^{m}$

1/5000 $= 1^{m}$

1/2500 $= 0.5^{m}$

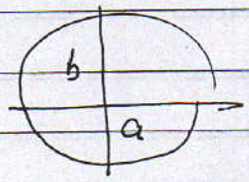
(10) $\sin \frac{\omega}{2} = \frac{a-b}{a+b}$

the conformality Condition is

$\sin \frac{\omega}{2} = \frac{a-b}{a+b} = 0$

∴ thats mean $a = b$

So the small circle on the earth is still circle after projection on the plane because a=b means it is a circle



with no distortion in angles (shap)