



• Answer all the following questions	• Duration: 3 Hours
• Illustrate your answers with sketches when necessary	• No of questions : <u>6</u> in <u>1</u> page
• Assume any missing data	• Total Marks: 90 Marks

Q1. Given a stereo pair of scanned 9' by 9' aerial images that have 65% overlap and 600 dpi resolution. Two points (p') and (q') appears on the right image where $x_{p'} = -73.11$ mm, $x_{q'} = +12.23$ mm and $y_{p'} = y_{q'} = -25.10$ mm. Calculate the approximate pixel coordinates of their conjugates (p) and (q) in left image. Assume that photo coordinate system has its origin at image center and is parallel to the pixel coordinate system. (15 marks)

Q2. Referring to the 4x4 patch of a digital image given beside, use the bilinear interpolation method to compute the interpolated value at the fractional locations ($r=725.42$, $c=573.38$) and ($r=726.36$, $c=574.44$). (10 marks)

	c:572	c:573	c:574	c:575	
r:725	63	65	74	78	
r:726	65	72	77	83	
r:727	59	66	72	76	

Q3. In generating a DEM from the stereo pair given in Q1, assume that a point B is one of the DEM points that has the following measured pixel coordinates: $c_b = 3800$ and $r_b = 910$ on the left image, and $c_{b'} = 1910$ and $r_{b'} = 910$ on right image. Given focal length $f=152$ mm. Exterior orientation elements of left image are $\omega=0$, $\phi=0$, $\kappa=0$, $X_L=350$ m, $Y_L=250$ m and $Z_L=880$ m. For the right image they are $\omega'=0$, $\phi'=0$, $\kappa'=0$, $X_L'=770$ m, $Y_L'=250$ m and $Z_L'=880$ m. Calculate ground coordinates of point B by space intersection using collinearity condition equations. (20 marks)

Q4. Apply Binomial operator and Laplacian operator (that has a value of -4 in its center) on the window shown beside. Show the results in each case. (15 marks)

10	13	5	9	12
13	17	12	10	8
12	26	11	9	10
10	15	13	16	13
12	16	19	18	21

Q5. Apply Förstner operator on the window shown beside and determine the trace of N^{-1} . (10 marks)

Q6. Given a 2300 pixel by 2300 pixel digital image with pixel size of 0.1 mm. Camera focal length $f=152$ mm. Exterior orientation elements of the image are $\omega=0$, $\phi=0$, $\kappa=0$, $X_L=360$ m, $Y_L=260$ m and $Z_L=970$ m. A point P is one of the DEM points used to generate an orthoimage for the image. Its 3-D ground coordinates are $X_P=680$ m, $Y_P=650$ m and $Z_P=80$ m. Calculate the coordinates of the point in the pixel coordinate system of the image. Explain how to get the point intensity value and determine the location in which it would be placed in the generated orthoimage. (20 marks)

