Major Examination

Name of the subject : Computer Vision **Subject code:ELL806 / EEL793**

Date of Exam: 21-11-2016. **Time duration: 2 Hours, M.M: 60**

Attempt any six questions. All questions carry equal marks.

1. For the weak calibration scenario, given an essential matrix **E**, how do we obtain valid **R** and **t**. What are the possible solutions of **R** and **t**? Explain with the help of diagrams.

2. For affine weak calibration scenario the set of corresponding points in the images are:

$\{(0,0) ; (0,1)\}$
$\{(0,1) ; (0,0)\}$
$\{(1,0) ; (1,1)\}$
$\{(1,1) ; (0,1)\}$

a) Obtain the two projection matrices.
b) Obtain the world coordinate of the point corresponding to the following pair of corresponding points on the 2 image planes $\{(0,1) ; (0,1)\}$.

3. Given a dynamic-programming algorithm for establishing stereo correspondences between 2 corresponding scan lines.

4. Given a line $y = x + 4$.
(i) Obtain its normal representation.
(ii) Given a point (4,5) obtain the set of points in the (m, c) space that corresponds to all the lines passing through this points.
(iii) Repeat for (ρ, θ) space.

5. Given the set of data points (1,2),(2,3),(3,3). Obtain the line which fits this data set the best
(a) Using least squares.
(b) Using total least squares.
(c) Show how minimizing the least square results in the set of equations used in (a) to obtain the solutions of the line.

6. There are two coins A and B. One is more likely to get heads and other is more likely to get tails. You pick one at random and toss it. There is a set of 6 rounds of 10 coin tosses with initial probability as θ_A=0.6 and θ_B=0.5. Solve it using EM algorithm to find which one of the 2 coins the set came from.
(i) H T T T H H T H T H
(ii) H H H H H T H H H H
(iii) H T H H H H H T H H
(iv) H T H T T T H H T T
(v) T H H H T H H H T H
(vi) H T T T H T T T T T

7. (a) Give an algorithm for RANSAC.
(b) How does one decide the number of samples required for the algorithm to work well?
(c) What are the other 2 key parameters of this algorithm.