Code
Number

EIGHTH SEMESTER B.TECH. DEGREE EXAMINATION

(2013 SCHEME)

SUBJECT : 13.806.3   MACHINE VISION(A) (Elective VI)

Time: 3 hours   **Max Marks: 100**

PART A

(**Answer all questions**. **Each question carries 4 marks**)

1. Derive the perspective projection equation for a virtual image located at a distance d in front of the pinhole.
2. What is the difference between the derivative of a Gaussian filter and the difference of Gaussians filter?

3. What is meant by stereopsis?

4. Explain how shape can be obtained from texture.
5. Discuss on shape priors for recognition.

PART B

(**Answer any one question from each module. Each question carries 20 marks.)**

MODULE 1

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6. a. Derive the camera calibration matrix. What are cameras intrinsic and extrinsic (calibration) parameters?   **10Marks**

    b. Discuss on camera calibration.   **10Marks**

OR

7. a. Explain the steps in binary image analysis.   **10Marks**
    b. Discuss on morphological operations for image analysis   **10Marks**
MODULE 2

8. a. Explain how hough transform can be used to detect curves.   **10 Marks**

    b Discuss on line fitting methods.   **10 Marks**

OR

9. a. Explain Harris corner detection.   **10 Marks**

    b. Discuss on edge detection using first order and second order derivatives.

                                                                         10 Marks

MODULE 3

10. a. Given reflectance map and a single image, explain how to obtain surface normals corresponding to real 3D scene that is imaged.   **10 Marks**

    b. Explain how active contours are used for image segmentation.   **10 Marks**

OR

11. a. Explain the steps for constructing SIFT feature.   **10 Marks**

    b. Discuss on multiresolution analysis.   **10 Marks**

MODULE 4

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12. a.Let M1 and M2 be two camera matrices. Assume that M1 = [I/0] and M2 = [A/a], where A is a 3x3 matrix. Prove that fundamental matrix corresponding to these camera matrices is of the form F = $[a]_x A$, where $[a]_x$ represents linear transformation matrix of cross product.   **10 Marks**

b. Briefly explain the principles of motion analysis and estimation. Explain how motion estimates can be used for segmentation.   **10 Marks**

OR

13. a. Explain the steps in obtaining structure from motion.   **10 Marks**

b. Briefly explain the principles of PCA. Explain the steps involved in determining principal components.   **10 Marks**

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