NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA
Department of Information Technology
VII Semester B.Tech (IT) Mid Sem Examination, September 2021
IT416: Computer Vision

Time: [45+10] Minutes **Max Marks: 25**

Date: 20/09/2021

Register No.

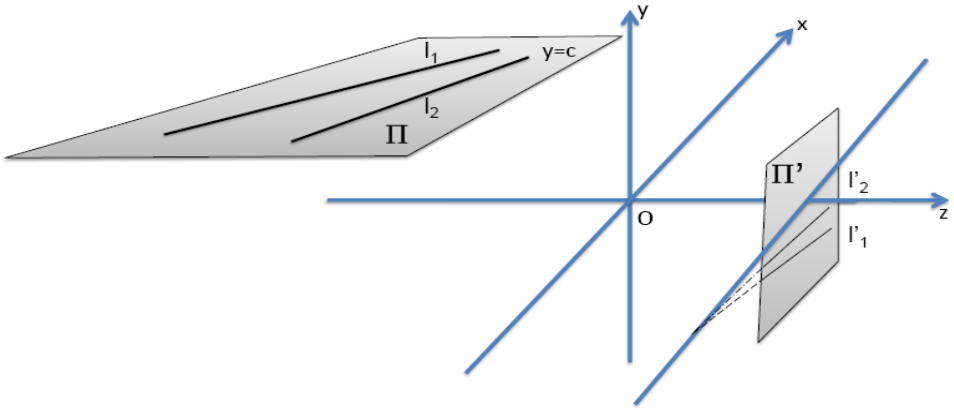
Note: Answer ALL questions to the point.

Questions

Q1:

In figure below, there are two parallel lines l_1 and l_2 lying on the same plane $\prod$. $l'_1$and l'_2 are their projections through the optical center O on the image plane π' .
Let's define plane $\prod'$ by y = c, line l_1 by equation ax + bz = d_1, and line l_2 by equation ax + bz = d_2. For any point P = (x; y) on l_1 or l_2, use the perspective projection equation below to find the projected point P' = (x'; y') on the image plane. f' is the focal length of the camera. Express your answer in terms of a, b, c, d, z and f'. **[04]**

$$\begin{cases} x' = f' \frac{x}{z} \\ y' = f' \frac{y}{z} \end{cases}$$



Q2: Consider two Image subsets S_1 [first four columns]and S_2[next four columns] for V= [0] determine whether the regions are . **[04]**

a) 4-adjacent
b) 8-adjacent
c) m-adjacent

1	**1**	**1**	**1**	**1**	**1**	**0**	**0**
1	**1**	**0**	**1**	**1**	**0**	**1**	**1**
1	**1**	**0**	**1**	**0**	**0**	**1**	**1**
1	**0**	**0**	**0**	**1**	**1**	**1**	**1**

Q3: Perform the histogram equalization on the following 5x5 image. The gray level distributions are given below. **[04]**

6	6	6	7	6
5	2	2	3	4
3	3	4	4	5
5	7	3	6	2
7	6	5	5	4

Q4: Consider the image segment shown in figure. Let V be the set of gray levels values used to defined connectivity in the image. Compute D_4,D_8 and D_m distances between pixels p and q for

1.V={2,3}

2.V={2,6} **[04]**

2(p)	3	2	6	1
6	2	3	6	2
5	3	2	3	5
2	4	3	5	2
4	5	2	3	6(q)

Q5: **1]** A grayscale transformation can be applied directly onto a grayscale image to manipulate its pixel values (assuming the range is [0,255]). Draw the diagrams for the following grayscale transformations:

i) Thresholding the image at pixel value 100.

ii) Linearly stretch the intensity in the interval [100,200] to [0,255]. **[01]**

2] Zoom the following image using [03]

a) Nearest neighbor interpolation

b) Zero order hold method

c) Zooming K times

10	**5**	**12**
2	**18**	**20**
22	**25**	**9**

Q6: a] Which of the following fact is true for an image? **[2.5]**

1. An image is the subtraction of the illumination component from the reflectance component.
2. An image is the multiplication of the illumination and reflectance component.
3. An image is the addition of illumination and reflectance component

4. An image is the subtraction of the reflectance component from the illumination component

   b] Given an intensity level [0, L-1] with "r" and "s" positive values, how will the negative of an image obtain?

1.s = L - 1 - r

2.s = L - 1 + r

3.s = L + 1 - r

4.s = L + 1 + r

c. The Hex code of green color is

(a) #00FF00

(b) #0000FF

(c) #00FFFF

(d) #FF00FF

d]. Which of the following factor does not affect the intrinsic parameters of a camera model?

(a) Focal length

(b) Offset of optical center

(c) Exposure

(d) Image resolution

e]. What is meant by the section of the real plane that the image coordinates have spanned?

1.Coordinate Axis

2.Plane of Symmetry

3.Spatial Domain

4.None of the above

Q7. Briefly Explain the Histogram Processing Techniques. **[1.5]**

Q8. Differentiate Sampling and Quantization. **[1]**
