

2101184

**MASTER OF VOCATION**  
**Robotics and Automation**  
**Subject: Machine Vision System**  
**Subject Code: CSE-902**  
**Semester: Third**  
**January 2021**  
**Theory (External): 70 Marks**  
**Time: 03 Hours**

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**Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 2 mark.
3. Section B comprises 8 essay type questions out of which students need to do any 10. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labeled

<b>Roll Number</b>										

**SECTION -A (SHORT/OBJECTIVE TYPE QUESTIONS)**  
**(10x2=20 Marks)**

- A What are the common imaging device used for robot vision systems?
- B Define Segmentation.
- C What is Thresholding?
- D Functions of machine vision system.
- E Define sensors and transducer.
- F Basic classifications of sensors.
- G What is Tactile sensor?
- H What is feature extraction?
- I Define gray value transformation.
- J Name some feedback devices used in robotics.

## SECTION -B (ESSAY TYPE QUESTIONS)

(5x10=50 Marks)

- Q1 (i) Define and classify lenses. (5)  
(ii) Explain the concept of lighting and illumination with schematic.(5)
- Q2 Write a short note on  
(i) ROS camera drivers (5)  
(ii)open NI and PCL. (5)
- Q3 Compare classical pattern recognition approach based on Bayesian approaches with neural net approaches by considering the feature space, classification approach and object models used by both of these approaches. (10)
- Q4 Write short notes on  
(i) Mapping sonar data (5)  
(ii)Iconic image processing (5)
- Q5 An image is filtered with three Gaussian low pass kernels of size 3x3, 5x5 and 7x7, and standard deviations 1.5,2 and 4 respectively. A composite filter,  $w$ , is formed as the convolution of these three filters.  
(i) Is the resulting filter Gaussian. Explain. (3)  
(ii) What is its standard deviation? (4)  
(iii) What is its size. (3)
- Q6 Restate the basic global thresholding algorithm so that it histogram of an image instead of the image itself. (10)

Q7 Obtain the grey level co occurrence matrix of an array pattern of alternating single 0's and 1's (starting with 0)if :

(i) The position operator Q is defined as "one pixel to the right" (5)

(ii) The position operator Q is defined as "two pixel to the right" (5)

Q8 Define

(i) Camera calibration (5)

(ii) installation and testing of ROS camera drivers. (5)

**\*\*\*\*\*END OF THE PAPER\*\*\*\*\***