[6181]-383A

B.E. (Robotics and Automation)
MACHINE VISION SYSTEM
(2019 Pattern) (Semester-VII) (411501)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*

   2)   *Neat diagrams must be drawn wherever necessary.*

   3)   *Figures to the right side indicate full marks.*

   4)   *Use of calculator is allowed.*

   5)   *Assume suitable data, if necessary.*

Q1) a)   Explain in detail geometic mean filters with relevant mathematical equations.   **[8]**

    b)   For the below given 5×5 image find out following: **[10]**

      Image-

      1 4 5 1 6

      6 5 7 2 2

      0 0 1 5 1

      2 0 1 0 6

      2 3 3 2 0

      i)   Probability Density Function (PDF) of each pixel value.

      ii)   Huffman's Code for each pixel value.

      iii)   What is the Huffman's code length for highest & lowest probability for pixel and why? Justify your answer.

<div align="center">OR</div>

Q2) a)   Below is the 5×4 binary image.   **[8]**

      Image-

      0 0 1 1 1

      1 1 1 0 0

      0 0 1 1 1

      1 1 0 0 0

      For the given image calculate following:

      i)   Total number of Run length vectors.

      ii)   Compression ratio.

      iii)   Predict if data is compressed? Justify your answer.

<div align="right">***P.T.O.***</div>

b) Write a short note on transform coding compression technique. **[5]**

c) What is the significance of probability density function in machine vision systems? Explain in detail. **[5]**

Q3) a) Explain region-based segmentation technique in detail. **[9]**

b) How the image is segmented with technique-based approach and explain an one type in detail? **[9]**

OR

Q4) a) Write a short note on approach-based segmentation in an image segmentation. **[9]**

b) How the image is segmented with technique-based approach and explain Structural technique in detail? **[9]**

Q5) a) Explain Fourier based alignment in motion estimation & how it is different from hierarchical motion estimation? **[9]**

b) Write a note on rotation & scale motion estimation techniques with relevant example. **[8]**

OR

Q6) a) Write a note on hierarchical motion estimation and explain how it is used & why it is common? **[9]**

b) Explain windowed correlation in motion estimation with relevant mathematical expression. **[8]**

Q7) a) What is supervised learning algorithm and explain in detail. **[9]**

b) What are deep neural networks and how it can be implemented in humanoid robots? **[8]**

OR

Q8) a) Explain in detail unsupervised learning algorithm and explain in detail.**[9]**

b) What are convolutional neural networks and explain how it is feasible to use in robotics applications. **[8]**