U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: VII**
Branch: ES – Cluster Elective **Duration: 3 hrs.**
Course Code: 19EI7CE2VA **Max Marks: 100**
Course: Vision Technology and Applications **Date: 19.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) What do you mean by Geometric Transformation in images? Represent image translation, rotation and scaling in matrix form. **06**

b) With relevant equations explain Laplacian of Gaussian (LoG) smoothing. Show how LoG operation can be applied in Canny's edge detector **06**

c) Explain the different steps involved in extracting Key Descriptors using Scale Invariant Feature Transform (SIFT) for extracting Vision Information **08**

UNIT - II

2 a) Explain the working of Region Based segmentation in object detection **06**

b) Differentiate Edge based technique from Texture based technique and illustrate the segmentation based on image texture for object detection **06**

c) **08**

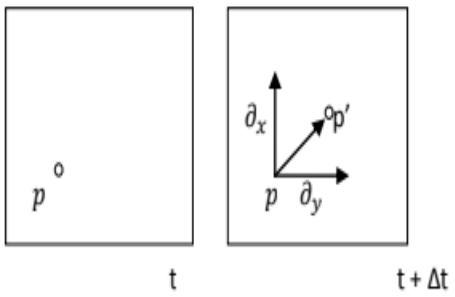

Fig 1.

There are two frames shown in Fig1. Estimate the motion of pixel p to p' from time t to $t + \Delta t$ using appropriate motion detention technique.

UNIT - III

3 a) Identify different elements in a Model of Artificial Neuron and mention its importance. **05**

b) What is Artificial Neural Network? How can we use "Neural Network" model concept to learn two input AND gate logic? Explain **07**

c) With the help of an equation of straight line , y=mx+c, where x is independent variable and y is dependent variable, show how Linear Regression model can be used for forecasting and analysis. **08**

OR

4 a) List three common types of Activation Functions used in Neural Networks. Elaborate on the Linear Activation function. **06**

b) What do you mean by Deep Neural Networks? Compare Single Layer Neural Network with Multi-Layer Neural Network **06**

c) **08**

	Weight(grams)	Length(cm)
Fruit1 (Class C1)	121	16.8
	114	15.2
Fruit2 (Class C2)	210	9.4
	195	8.1

Table-1

The Table-1 shows the classes of fruits obtained by training the Neural Network. Explain the testing of an unknown fruit for its class using the Artificial Neural Network.

UNIT - IV

5 a) With the help of a block diagram, describe the control architecture of a serial manipulator for joint torque control. **07**

b) Classify the sensors used in Robots based on their operations. Explain the sensing and control mechanism adopted for position and acceleration in joints. **08**

c) Explain the working of a Hall effect sensor for position and speed sensing in magnetic encoders as part of Robot Control system. **05**

OR

6 a) Explain the working of (i) LVDT (ii) Accelerometer for sensing displacement and acceleration of joints in a Robot **07**

b) With the help of generalised block diagram, explain the role of Vision technology in motion planning for a Robot **05**

c) Why do you need digital encoders in a Robot control system? With the help of a block diagram describe the working of an incremental optical encoder **08**

UNIT - V

7 a) Identify different stages in building a vision system for autonomous Robot and explain the sequence of operations in Robot Vision System. **08**

b) Why Deep Leering algorithms are important in Robot motion planning? Discuss **05**

c) With the help of any two examples explain the AI based vision system and its significance **07**

****