B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Artificial Intelligence and Data Science

20AIPC501 - COMPUTER VISION

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

		Marks	K–Level	CO
1.	Computer vision is concerned with modeling and replicating human vision using ... (a) Computer software (b) Computer hardware (c) Computer software and hardware (d) None of the mentioned	1	K1	CO1
2.	Lenses having the longer focal length will provide............... magnification (a) Lower (b) Higher (c) Narrow (d) Remains the same	1	K1	CO1
3.	What does a peak in a histogram indicate? (a) The presence of objects in the image (b) High contrast areas in the image (c) Intensity values that occur frequently in the image (d) Color variations in the image	1	K1	CO2
4.	What is the first step in the Harris Corner Detection procedure? (a) Convert image to binary (b) Convert image to grayscale (c) Perform edge detection (d) Apply Gaussian blur	1	K1	CO2
5.	The .... detector and descriptor were designed as an efficient alternative to SIFT. (a) HOG (b) SIFT (c) SURF (d) All of the mentioned	1	K1	CO3
6.	The Laplacian of Gaussian edge detection technique looks for zero-crossings in the _____ derivative of image intensity. (a) Second (b) First (c) Third (d) Fourth	1	K1	CO3
7.	What is the role of the "source" and "sink" nodes in a graph cut? (a) They define the boundaries of the image (b) They represent the foreground and background regions (c) They provide color information (d) They handle image noise reduction	1	K1	CO4
8.	Which of the following are approaches to segmentation? (a) Edge segmentation (b) Region based segmentation & edge segmentation (c) Adaboost approach (d) Haar-like feature & 3-D rectangle approach	1	K1	CO4
9.	Spline-based motion estimation is mainly used to _____. (a) track the movement of objects in a video sequence (b) enhance image details by applying filters (c) analyze color variations in an image (d) generate artistic effects in images	1	K1	CO5
10.	A discriminant function is a mathematical function that _____. (a) generates random patterns (b) classifies input patterns into predefined categories (c) measures the level of noise in a pattern (d) determines the brightness of patterns	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

		Marks	K–Level	CO
11.	Write the characteristic function of a binary image.	2	K1	CO1
12.	List out the differences between CCD and CMOS sensors.	2	K1	CO1

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13914**

| No.	Question	Marks	K	CO
13.	Name the methods used for edge detection.	2	K1	CO2
14.	Infer the main purpose of image restoration from its role in recovering images.	2	K2	CO2
15.	Explain why the iris is considered a reliable biometric feature for personal identification.	2	K2	CO3
16.	Explain the role of the Hough Transform in line detection.	2	K2	CO3
17.	Why is the choice of seed point important in Region Growing?	2	K1	CO4
18.	What does an MRF (Markov Random Field) represent in image segmentation?	2	K1	CO4
19.	Define object detection in computer vision.	2	K1	CO5
20.	Explain how object detection contributes to autonomous driving systems.	2	K2	CO5
21.	Compare K-Means with K-Medoids clustering.	2	K2	CO6
22.	What is a discriminant function in supervised classification?	2	K1	CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23. a) Explain in detail the various components of a computer imaging system and explain the function of each component.　　11　K2　CO1

OR

b) Explain the working principles of pinhole projection and perspective projection models used in image formation.　　11　K2　CO1

24. a) Explain how histogram equalization improves image contrast with a given example input image matrix.　　11　K2　CO2

1	2	1	1	1
2	5	3	5	2
2	5	5	5	2
2	5	3	5	2
1	1	1	2	1

OR

b) Describe the principles of affine transformation and projective transformation with the neat sketch.　　11　K2　CO2

25. a) Discuss the process of extracting HOG features from an image. Explain how the gradient magnitude and direction contribute to the final feature vector.　　11　K2　CO3

OR

b) Describe the Hough Transform technique for circle detection. Explain how image points are mapped into parameter space, and write the step-by-step procedure with a neat diagram.　　11　K2　CO3

26. a) Using the given flow network; apply the Max-Flow Min-Cut algorithm to compute the capacity and maximum flow from the source (s) to the sink (t).　　11　K3　CO4
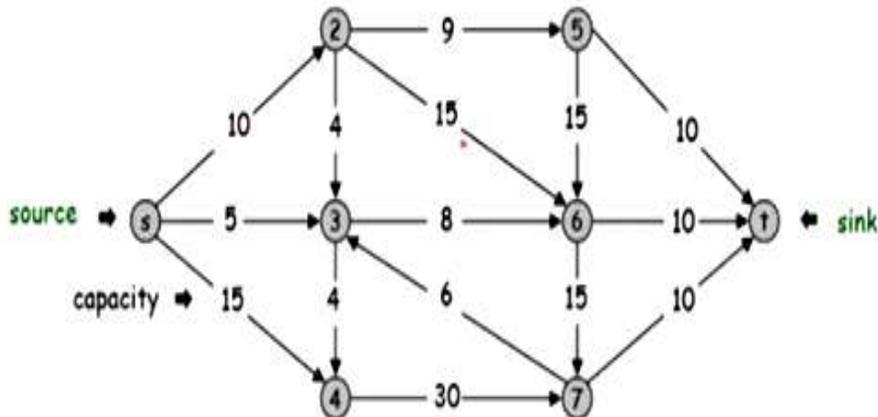
OR

b) Using the given 8×8 grayscale image, apply the Region Splitting and Merging algorithm with threshold T=3 to perform image segmentation. *11 K3 CO4*

5	6	6	6	7	7	6	6
6	7	6	7	5	5	4	7
6	6	4	4	3	2	5	6
5	4	5	4	2	3	4	6
0	3	2	3	3	2	4	7
0	0	0	0	2	2	5	6
1	1	0	1	0	3	4	4
1	0	1	0	2	3	5	4

27. a) Explain parametric motion models with suitable examples. *11 K2 CO5*

OR

b) Explain in detail the process of object detection in computer vision. *11 K2 CO5*

28. a) Using the dataset below, apply the K-Means clustering algorithm to group the individuals into 2 clusters. *11 K3 CO6*

X	185	170	168	179	182	188	180	180	183	180	180	177
Y	72	56	60	68	72	77	71	70	84	88	67	76

OR

b) Using the dataset given below apply Naïve Bayes Algorithm to classify a particular species if its features are (Slow, Rarely, No). *11 K3 CO6*

S. No	Swim	Fly	Crawl	Class
1	Fast	No	No	Fish
2	Fast	No	Yes	Animal
3	Slow	No	No	Animal
4	Fast	No	No	Animal
5	No	Short	No	Bird
6	No	Short	No	Bird
7	No	Rarely	No	Animal
8	Slow	No	Yes	Animal
9	Slow	No	No	Fish
10	Slow	No	Yes	Fish
11	No	Long	No	Bird
12	Fast	No	No	Bird