Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2024

RA3CO46 Computer Vision

Programme: B.Tech. Branch/Specialisation: RA

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. What is digital image processing? **1**

(a) It's an application that alters digital videos

(b) It's a software that allows altering digital pictures

(c) It's a system that manipulates digital medias

(d) It's a machine that allows altering digital images

ii. Which of the following process helps in image enhancement? **1**

(a) Digital image processing (b) Analog image processing

(c) Both (a) and (b) (d) None of these

iii. Which of the following is an example of digital image processing? **1**

(a) Computer graphics (b) Pixels

(c) Camera mechanism (d) All of these

iv. What are the categories of digital image processing? **1**

(a) Image enhancement (b) Image classification and analysis

(c) Image transformation (d) All of these

v. How does picture formation in the eye vary from image formation in a camera? **1**

(a) Fixed focal length

(b) Varying distance between lens and imaging plane

(c) No difference

(d) Variable focal length

vi. What are the names of the various colour image processing categories? **1**

(a) Pseudo-color and multi-color processing

(b) Half-color and pseudo-color processing

(c) Full-color and pseudo-color processing

(d) Half-color and full-color processing

P.T.O.

vii. Which characteristics are taken together in chromaticity? **1**
(a) Hue and saturation
(b) Hue and brightness
(c) Saturation, hue, and brightness
(d) Saturation and brightness

viii. Which of the following statement describe the term pixel depth? **1**
(a) It is the number of units used to represent each pixel in RGB space
(b) It is the number of mm used to represent each pixel in RGB space
(c) It is the number of bytes used to represent each pixel in RGB space
(d) It is the number of bits used to represent each pixel in RGB space

ix. Which of the following is the first and foremost step in image processing? **1**
(a) Image acquisition (b) Segmentation
(c) Image enhancement (d) Image restoration

x. Which of the following image processing approaches is the fastest, most accurate, and flexible? **1**
(a) Photographic (b) Electronic
(c) Digital (d) Optical

Q.2 Attempt any two:
i. Explain 2D transformation with a neat diagram. **5**
ii. What is computer vision? Why is vision so difficult? Provide six real-world examples of computer vision and explain. **5**
iii. With a neat diagram explain the Image sensing pipeline and its important effects. **5**

Q.3 Attempt any two:
i. Explain the popular technique used in object detection. **5**
ii. Explain SIFT and HOG descriptors. **5**
iii. Write short note on active contours, region splitting and region merging. **5**

Q.4 Attempt any two:
i. Explain intrinsic and extrinsic parameters of camera calibration. **5**
ii. Explain camera parameters from projection matrices. **5**
iii. Write short note on orthographic, weak perspective, affine and perspective camera models. **5**

Q.5 Attempt any two:
i. Write and explain techniques of motion tracking. **5**
ii. Explain the Kalman filter. **5**
iii. Explain the projective structure and motion from two images and multiple images. **5**

Q.6 Attempt any two:
i. Explain the popular technique used in object detection with a real world example. **5**
ii. Explain appearance-based methods of object recognition. **5**
iii. Write applications of object recognition. **5**

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Marking Scheme

Computer Vision (T) - RA3CO46 (T)

Q.1	i)	What is Digital Image Processing? b) It's a software that allows altering digital pictures	**1**
	ii)	Which of the following process helps in Image enhancement? c) Both a and b	**1**
	iii)	Which of the following is an example of Digital Image Processing? d) All of the mentioned	**1**
	iv)	What are the categories of digital image processing? d) All of the mentioned	**1**
	v)	How does picture formation in the eye vary from image formation in a camera? d) Variable focal length	**1**
	vi)	What are the names of the various colour image processing categories? c) Full-color and pseudo-color processing	**1**
	vii)	Which characteristics are taken together in chromaticity? a) Hue and Saturation	**1**
	viii)	Which of the following statement describe the term pixel depth? d) It is the number of bits used to represent each pixel in RGB space	**1**
	ix)	Which of the following is the first and foremost step in Image Processing? a) Image acquisition	**1**
	x)	Which of the following image processing approaches is the fastest, most accurate, and flexible? c) Digital	**1**

Q.2		Attempt any two:		
	i.	Explanation 2D transformation	-3 marks	**5**
		neat diagram	-2 marks	
	ii.	What is Computer Vision?	-2 marks	**5**
		Why is vision so difficult?	-2 marks	
		Provide six real-world examples.	-1 marks	
	iii.	Explanation With of Image sensing pipeline.	-2 marks	**5**
		neat diagram .	-1 marks	
		important effects.	-2 marks	

Q.3		Attempt any two:		
	i.	Name of technique used in Object Detection.	-2 marks	**5**
		Explanation.	-3 marks	
	ii.	SIFT .	-2.5 marks	**5**
		HOG .	-2.5 marks	
	iii.	Active contours	-1 marks	**5**
		region splitting	-2 marks	
		region merging	-2 marks	

Q.4		Attempt any two:		
	i.	Intrinsic parameters of camera calibration	-3 marks	**5**
		extrinsic parameters of camera calibration	-2 marks	
	ii.	Explain camera parameters from projection matrices.		**5**
	iii.	orthographic, weak perspective	-3 marks	**5**
		perspective camera models.	-2 marks	

Q.5		Attempt any two:		
	i.	Name of technique	-2 marks	**5**
		Explanation.	-3 marks	
	ii.	Explain the Kalman filter.	-5 marks	**5**
	iii.	For two images	-2 marks	**5**
		For multiple images.	-3 marks	

Q.6		Attempt any two:		
	i.	Explanation	-3 marks	**5**
		real world example	-2 marks	
	ii.	Explanation	-5 marks	**5**
	iii.	Each applications of object recognition.	–(1*5) marks	**5**

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