(6 pages)

Reg. No. : .....

Code No. : 7898 **Sub. Code : WCSM 31**

M.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2024.

Third Semester

Computer Science — Core

DIGITAL IMAGE PROCESSING

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. A continuous image is digitized at ———— points.
   (a) random (b) vertex
   (c) contour (d) sampling

2. The smallest discernible change in intensity level is called ————
   (a) Intensity resolution (b) Contour
   (c) Saturation (d) Contrast

3. What is the tool used in tasks such as zooming, shrinking, rotting, etc?
   (a) Sampling (b) Interpolation
   (c) Filters (d) None of the above

4. Continuous functions are sampled to form a ———
   (a) Fourier series (b) Fourier transform
   (c) Fast Fourier series (d) Digital image

5. The spatial coordinates of a digital image (x, y) are proportional to ————
   (a) Position (b) Brightness
   (c) Contrast (d) Noise

6. The range of values spanned by the gray scale is called ————
   (a) Dynamic range (b) Band range
   (c) Peak range (d) Resolution range

7. Which of the following is the primary objective of sharpening of an image?
   (a) Blurring the image
   (b) Highlight fine details in the image
   (c) Increase the brightness of the image
   (d) Decrease the brightness of the image

8. Which is a colour attribute that describes a pure colour?

(a) Saturation (b) Hue

(c) Brightness (d) Intensity

9. What is pixel?

(a) Pixel is the elements of a digital image

(b) Pixel is the elements of an analog image

(c) Pixel is the cluster of a digital image

(d) Pixel is the cluster of an analogy image

10. The number of grey values are integer powers of ————

(a) 4 (b) 2

(c) 8 (d) 1

11. If inner region of object is textured then approach we use is ————

(a) discontinuity (b) similarity

(c) extraction (d) recognition

12. Approach to restoration is ————

(a) inverse filtering (b) spike filtering

(c) black filtering (d) ranking

13. Enhancement of differences between images is based on the principle of ————

(a) Additivity (b) Homogeneity

(c) Subtraction (d) Multiplication

14. If R is a subset of pixels, we call R a ———— of the image if R is a connected set.

(a) Disjoint (b) Region

(c) Closed (d) Adjacent

15. Two regions are said to be ———— if their union forms a connected set.

(a) Adjacent (b) Disjoint

(c) Closed (d) Matrix

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

16. (a) What are the fundamental steps in digital image processing? Explain.

Or

(b) Describe the process of image acquisition using a single sensor.

17. (a) Elaborate the piecewise-linear transformation functions.

Or

(b) Summarize the functions of Order-Statistic (Nonlinear) filters.

18. (a) Decide the spatial and frequency properties of noise.

Or

(b) Highlight the purpose of Bandreject filters and Bandpass filters.

19. (a) Explain the irrelevant information in image compression.

Or

(b) Dissect the types of image compression standards.

20. (a) Distinguish between the region splitting and merging.

Or

(b) Recall the implementation of watershed segmentation algorithm.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

21. (a) Examine the origins of digital image processing.

Or

(b) Determine the image acquisition using sensor strips.

22. (a) Appraise the use of histogram statistics for image enhancement.

Or

(b) Illustrate the vector representation of linear filtering.

23. (a) Draw and explain the restoration in the presence of noise only in spatial filtering.

Or

(b) Elaborate the estimating the degradation function.

24. (a) Discuss the elements of information theory.

Or

(b) Assume the implementation of error free compression.

25. (a) Demonstrate the image smoothing to improve global thresholding.

Or

(b) Conclude the use of motion in segmentation.
