Subject Code: KCS062

PAPER ID-410561

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2023-24
IMAGE PROCESSING

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Define components of image processing system.	02	1
b.	What is meant by illumination and reflectance.	02	1
c.	What is meant by binary image, color image, gray-scale image	02	2
d.	What is the need of Image Enhancement.	02	2
e.	What is contrast stretching.	02	3
f.	What are the types of Noise.	02	3
g.	What do you understand by Convex Hull.	02	4
h.	Define morphological image processing.	02	4
i.	In which situation we use region merging and region splitting.	02	5
j.	What are first order derivative filters.	02	5

SECTION B

2. Attempt any *three* of the following: **3 x 10 = 30**

a. What do you understand by Digital image processing. Explain the different stages of digital image processing? — 10 — 1

b. Explain the term histogram. How can histogram stretching of an image can be done. Compute histogram stretching of a given image. — 10 — 2

Gray level	0	1	2	3	4	5	6	7
Number of Pixel	0	0	20	20	5	19	0	0

c. Given below is a 4 x 4 image. What will be the new value of the pixel (2, 3) if following filters are applied. — 10 — 3

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

a) Arithmetic mean Filter c) Harmonic mean filter
b) Geometric mean filter d) Max and Min filter

d. What do you understand by hit-miss transform and why they are used explain in brief? — 10 — 4

e. Explain the following morphological operations:
i. Opening ii. Closing iii. Region filling — 10 — 5

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SECTION C

3. Attempt any *one* part of the following: 1 x 10 = 10

a.	Briefly explain the elements of visual perception. Explain how image is formed.	10	1
b.	Write short notes on a) Sampling and Quantization b) Brightness adaption and discrimination.	10	1

4. Attempt any *one* part of the following: 1 x 10 = 10

a.	Derive the frequency domain transformation function H (u, v) for the following spatial domain filter h (x, y). How Homomorphic filtering is implemented. 0 -1 0 -1 8 -1 0 -1 0	10	2
b.	Discuss order statistics filters with suitable example.	10	2

5. Attempt any *one* part of the following: 1 x 10 = 10

a.	What is image restoration. Draw and explain the basic block diagram of restoration process.	10	3
b.	What are the linear and non-linear smoothing filters in spatial domain. Compute the new pixel values after applying the 3 x 3 box filter on the following 4 x 4 matrix of a 3-bit image. 3 7 0 7 4 4 1 5 3 2 2 3 5 0 6 4	10	3

6. Attempt any *one* part of the following: 1 x 10 = 10

a.	Explain thinning operation. Thin the following image. Show the image after each step. 1 1 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 0 0 1 1 1 1 1 1 1 1 0 0 1 1 1 0 0 1 1 1 0 0	10	4
b.	Explain the Region-based Segmentation. Explain the types of region-based segmentation in Image Processing.	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

a.	Discuss about the principle of lossless compression algorithms with suitable examples.	10	5
b.	Write a short note on following: a) Edge detection algorithm b. Line detection algorithm	10	5