



Name: ..... Roll No.: .....

Branch: ..... Signature of Invigilator: .....

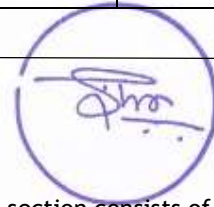
Semester: VIth

Date: 25/04/2022 (MORNING)

Subject with Code: IT307 IMAGE PROCESSING

| Marks Obtained | Section A<br>(30) | Section B<br>(20) | Total Marks<br>(50) |
|----------------|-------------------|-------------------|---------------------|
|                |                   |                   |                     |

INSTRUCTION TO CANDIDATE



1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.
2. The booklet will be distributed to the candidates before 05 minutes of the examination. Candidates should write their roll no. in each page of the booklet.
3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.
4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.
5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.
6. Write on both side of the leaf and use pens with same ink.
7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.
8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.
9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.
10. Always maintain the highest level of integrity. Remember you are a BITian.
11. Candidates need to submit the question paper cum answer sheets before leaving the examination hall.

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: BTECH  
BRANCH: IT

SEMESTER : VI  
SESSION : SP 22

SUBJECT: IT307 Image Processing

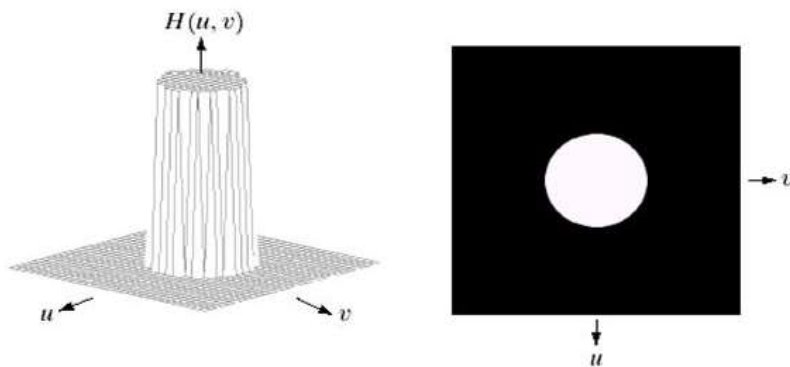
TIME: 2 HRS

FULL MARKS: 50

Section A Multiple Choice Questions

Total [30]

1. The RGB triplet for Blue color is [1]
  - a. [0, 0, 1]
  - b. [255, 255, 0]
  - c. [0, 0, 255]
  - d. [0, 255, 255]
2. False contouring is caused due to: [1]
  - a. Low spatial resolution
  - b. Low intensity resolution
  - c. Nearest neighbor interpolation
  - d. Bilinear interpolation
3. The value of an impulse function at any other point than 0 is [1]
  - a. Undefined
  - b. Infinite
  - c. 1
  - d. 0
4. The figure below represents a \_\_\_\_\_ filter. [1]



- a. Butterworth low pass
  - b. Ideal high pass
  - c. Ideal low pass
  - d. Gaussian low pass
5. 8 bits per pixels is the \_\_\_\_\_ of an image. [1]

- a. Size
  - b. Spatial resolution
  - c. Intensity resolution
  - d. Aspect ratio
6. The response of second order derivative \_\_\_\_\_ [1]
- a. Is non zero at the onset of a ramp
  - b. Is constant along the ramp of constant slope
  - c. Has zero crossing at an edge
  - d. All of the above
7. The technique of enhancing a range of intensities and suppressing the other intensities is called as \_\_\_\_\_ [1]
- a. Bit plane slicing
  - b. Histogram specification
  - c. Gray level slicing
  - d. Contrast stretching
8. Which of the following transform is equivalent to performing a 2d differentiation on the image? [1]
- a. Fourier transform
  - b. Laplacian transform
  - c. Hadamard transform
  - d. Walsh transform
9. Histogram equalization uses. [1]
- a. Entropy
  - b. Cumulative distribution function
  - c. Standard deviation
  - d. Eigen value
10. \_\_\_\_\_ matrix shows the dependence between variables. [1]
- a. Identity
  - b. Inverse
  - c. Covariance
  - d. Hermitian
11. The basis function of which of the following transform is derived from the input data [2]
- a. Walsh
  - b. Hadamard
  - c. Fast Fourier
  - d. None of the above
12. Histogram of a good contrast image is [2]
- a. Evenly distributed
  - b. Concentrated in the center
  - c. Concentrate on the left
  - d. All of the above
13. The complexity of Fast Fourier Transform is [2]
- a.  $O(\log n)$

- b.  $O(n \log n)$   
 c.  $O(n)$   
 d. None of the above
14. Sharpness in an image is because of [2]  
 a. High value of Low frequency components  
 b. High value of High frequency components  
 c. Low value of High frequency components  
 d. None of the above
15. The positive value of order Q of a Contra Harmonic mean filter eliminates [2]  
 a. Pepper noise  
 b. Salt noise  
 c. Both a & b  
 d. None of the above
16. The output value after applying Median filter on the center pixel is \_\_\_\_\_ [2]  
 150 170 160  
 155 140 180  
 146 148 189  
 a. 140  
 b. 155  
 c. 159.7  
 d. 189
17. \_\_\_\_\_ is the Laplacian filter's output on the center pixel of the following image. [2]  
 15 16 14  
 25 28 30  
 45 47 50  
 a. 4  
 b. 16  
 c. 6  
 d. 0
18. For frequency (20, 30) the response  $H(u, v)$  of Butterworth high pass filter of order  $n=2$  will be \_\_\_\_\_. Given the cut off frequency  $D_0 = 20$  and  $u = 0, 1 \dots 99$ ;  $v = 0, 1 \dots 99$ . Take distance  $D(u, v)$  of (20, 30) from centre i.e.,  $M/2, N/2$ . [2]  
 a. 0.49  
 b. 0.65  
 c. 0.91  
 d. 0.36
19. The minimum  $D_4$  and  $D_8$  distance between pixels 'p' and 'q', given  $V = \{0, 1\}$  is \_\_\_\_\_ and \_\_\_\_\_ [2]

|       |   |   |       |
|-------|---|---|-------|
| 2     | 0 | 2 | 1 (q) |
| 2     | 0 | 1 | 0     |
| 1     | 1 | 0 | 0     |
| 0 (p) | 2 | 0 | 1     |

- a. 5,4  
 b. 6, 3  
 c. 5,5

d. 6, 4

20. The output at the center pixel after applying Averaging filter on the below image is \_\_\_\_ [2]

150 170 160

155 140 180

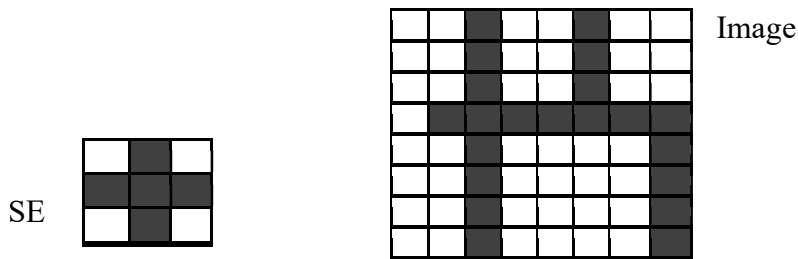
146 148 189

- a. 159.7
- b. 162.2
- c. 149.9
- d. 180

**Section B Subjective Questions**

**Total [20]**

1. How is Image Sharpening done in frequency domain? Discuss the appropriate filters. [5]
2. The histogram of an image is concentrated towards the left side of the intensity range. Suggest a spatial intensity transformation technique that can work to enhance the appearance of the image. [5]
3. Apply closing operation on the following image using the mentioned Structuring element and show the output. [5]



4. Compute the DFT of the following sequence of pixels  $f(x) = \{1, 2, 8, 9\}$ . [5]



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