



# ST. ANNE'S

## COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai)

(An ISO 9001: 2015 Certified Institution)

ANGUCHETTYPALAYAM, PANRUTI – 607 106.

### QUESTION BANK

**PERIOD : JULY - NOV 2018**

**BATCH: 2015 – 2019**

**BRANCH : ECE**

**YEAR/SEM: IV/VII**

**SUB CODE/NAME: IT 6005 - DIGITAL IMAGE PROCESSING**

### UNIT I

#### DIGITAL IMAGE FUNDAMENTALS

#### PART – A

1. Elucidate on Quantization [D] (April/May 2018, Nov/Dec 2017)
2. List color models involved in hardware. [D] (April/May 2018)
3. Differentiate photopic and scotopic vision [ID] (Nov/Dec 2017)
4. When is fine sampling and coarse sampling used [ID] (April/May 2017)
5. What is the function of an image sensor [ID] (April/May 2017)
6. Define Mach band effect. [D] (Nov/Dec 2016) (May'14) (May'13)(May'15)(Dec'15)
7. Define checker board effect [D] (Nov/Dec 2016)
8. Define Brightness. [D] (Dec'12)(May'15)
9. Define Contrast [D] (Dec'12) (May'15)
10. Define Optical illusion [D] (May'13)
11. What is Hue & saturation? [D] (May'14)
12. Define subjective brightness and brightness adaptation[D] (June'12)
13. What is simultaneous contrast? [ID] (Dec'12)(May'15)
14. What is monochrome image and gray image? [ID] (Dec'13) (Dec'14)
15. Define Image. [D]
16. What is Dynamic Range? [D]
17. What do you mean by Gray level? [ID]
18. What do you meant by Color model? [ID]
19. List the applications of color models. [D]
20. Define Resolution[D]
21. What is meant by pixel? [D]
22. Define Digital image? What is gray scale image? [D]
23. What are the steps involved in DIP? [D]
24. Specify the elements of DIP system[D]
25. Explain the categories of digital storage?[D]

26. What are the types of light receptors? [D]
27. How cones and rods are distributed in retina? [ID]
28. Define weber ratio[D]
29. What is meant by illumination and reflectance? [D]
30. Define sampling and quantization[D]
31. Find the number of bits required to store a 256 X 256 image with 32 gray levels[ID]
32. Write the expression to find the number of bits to store a digital image? [ID]
33. Write short notes on neighbors of a pixel. [ID]
34. Define the term Luminance[ID]

## **PART-B**

### **[FIRST HALF]**

#### **Steps in Digital Image Processing**

1. Describe the fundamental steps in digital image processing (or) Explain the steps involved in digital image processing. (or) Explain various functional block of digital image processing (13) [D] (Apr/May 2018) (Dec'13)
2. With necessary diagrams explain how an Analog image is Converted into digital image. (8) [D] (Nov/Dec 2016)

#### **Components**

3. Describe the functions of elements(Components) of digital image processing system with a diagram(13) [ID] (April/May 2017,Nov/Dec 2017) (Dec'12)(Dec'14) (May'14)(Dec'15)
4. List and explain various elements of digital image processing system (13) [ID] (April/May 2017, Nov/Dec 2017) (Dec'12)(Dec'14) (May'14)(Dec'15)

#### **Elements of Visual Perception**

5. Describe the elements of visual perception.(8) [D].

### **[SECOND HALF]**

#### **Image Sensing and Acquisition**

6. Write short notes on Image sensing and acquisition. .(8) [D]
7. With the neat diagram image sensing and acquisition and also explain image acquisition using sensor strips. (13) [D] (Apr/May 2018)
8. Describe image formation in the eye with brightness adaptation and discrimination.(8) [ID]
9. What is meant by image sensing? Explain in detail the construction and operation of various image acquisition devices. (8) [D] (Nov/Dec 2016)
10. What is a color model? What are its types? Explain RGB and HIS models with necessary diagrams. (12)

**[ID] (Nov/Dec 2016)**

### **Image Sampling and Quantization**

11. Discuss the effect of non uniform sampling and quantization. **(8) [ID] (April/May 2017)**
12. Describe the how image is digitized by sampling and quantization about checker board effect and false contouring with neat sketch **.(8) [ID] (May'15)**
13. Explain in detail about the phenomenon of image sampling. Illustrate how aliasing happens if sampling theorem is violated. **(13) [ID] (Nov/Dec 2017)**
14. Explain the various distance measures used for image analysis. **(4) [D] (Nov/Dec 2016)**
15. Write short notes on sampling and quantization.**(8) [D] (May'14) (May'13)**
16. Explain in detail about vidicon and digital camera. **.(8) [D] (May'14)(Dec'14)**
17. Explain the working principle of a digital camera with a diagram. **.(8) [D] (Dec'15)**

### **Relationships between pixels**

18. Explain the basic relationships between pixels? **.(8) [ID] (Dec'12)**

### **Color models**

19. How color image is represented using HSI color space model. **(8) [ID] (April/May 2017)**
20. Discuss HIS color model in detail. **.(8) [ID] (Dec'15)**
21. Explain in detail about various color models used in image processing. **.(8) [D]**

## **UNIT II**

### **IMAGE ENHANCEMENT**

#### **PART B**

1. Necessitate the need for transform **(ID) (April/May 2018)**
2. Name the different types of derivative filter in DIP. **(ID) (April/May 2018)**
3. Whether two different images have same histogram?Justify **(ID) (Nov/Dec 2017)**
4. For an 8 bit image, write the expression for obtaining the negative of the input image**(ID) (N/D'17)**
5. What is meant by bit plane slicing? **(ID) (N/D'16)**
6. What is meant by masking? **(D) (N/D'16)**
7. Give the properties of the first and second derivative around an edge **(ID) (May'15)**
8. Define directional smoothing filter **(D) (Dec'15)**
9. If all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer. **(ID) (April/May 2017)**
10. Distinguish between image enhancement and image restoration. **(ID) (April/May 2017) (Dec'15)**
11. Explain the 2 categories of image enhancement. **(D) (Dec'12)**
12. What is contrast stretching? **(D) (Dec'13)**
13. What is meant by histogram equalization? **(D) (June'12)(Dec'15)**

14. What is a Median filter? **(D) (Dec'13)**
15. Define spatial averaging. **(May'14) (D)**
16. What are the properties of unitary transform? **(ID) (Dec'13)**
17. Specify the objective of image enhancement technique. **(D)**
18. What is grey level slicing? **(D)**
19. Define image subtraction. **(D)**
20. What is the purpose of image averaging? **(D)**
21. Give the formula for negative and log transformation. **(ID)**
22. Define histogram. **(D)**
23. Define Derivative filter **(D)**
24. Explain spatial filtering **(D)**
25. Give the mask used for high boost filtering. **(ID)**
26. What is maximum filter and minimum filter? **(D)**
27. Write the application of sharpening filters **(D)**
28. Name the different types of derivative filters **(D)**
29. What is the need for transform? **(D)**
30. What is Image Transform? **(D)**
31. What are the applications of transform? **(D)**
32. Give the Conditions for perfect transform. **(D)**
33. Write the steps involved in frequency domain filtering. **(D)**

## **PART-B**

### **[FIRST HALF]**

#### **Gray level transformations**

1. Explain the following gray level transformation techniques in detail **(16) [D] (Nov/Dec 2017)**
  - i) Image negative
  - ii) Thresholding
  - iii) Gray level slicing and
  - iv) Logarithmic transformation
2. How color image is enhanced and compare it with grayscale processing? **(8) [D] (May'15)**

#### **Histogram processing**

3. Justify why histogram processing is called as an efficient tool for graphical representation of the total representation of the total distribution in a digital image. **(15) [ID] (April/May 2018)**
4. What is histogram? Explain histogram equalization and matching **(13) [D] (Apr/M'18) (May'14)**
5. Briefly discuss about histogram equalization technique. **(8) [D] (Nov/Dec 2016)**
6. Write the salient features of image histogram. What do you infer? **(8) [D]**

7. Explain histogram specification technique in detail with equations. (8) [D] (Dec'15)
8. Why histogram equalization is considered as an "idempotent operation"? Perform histogram equalization of the image [3 2 4 5 4 (16) [ID] (Nov/Dec 2017)

3 4 5 4 3

3 5 5 5 4

3 4 5 4 3

4 5 2 4 4]

9. Perform histogram equalization of the image. (8) [ID] (Nov/Dec 2016)

[ 4 4 4 4 4

3 4 5 4 3

3 5 5 5 3

3 4 5 4 3

4 4 4 4 4]

10. Describe histogram equalization. Obtain histogram equalization for the following image segment of size 5 X 5. Write the interference on the image segment before and after equalization.

a. 20 20 20 18 16

b. 15 15 16 18 15

c. 15 15 19 15 17

d. 16 17 19 18 16

e. 20 18 17 20 15 (5 X 5) matrix (8) [D] (May'13)

11. Describe histogram equalization. Obtain histogram equalization for the following 8 bit image segment of size 5 X 5. Write the interference on the image segment before and after equalization.

a. 200 200 200 180 240

b. 180 180 180 180 190

c. 190 190 190 190 180

d. 190 200 220 220 240

e. 230 180 190 210 230 (5 X 5) matrix (8) [D] (May'15)

[SECOND HALF]

### Introduction to Fourier Transform

12. Enumerate Discrete fourier transform in detail (13) [D] (April/May 2018)

### Smoothing and Sharpening frequency domain filters

13. Explain the various enhancement technique performed in spatial domain. (8) [D] (April/May 2017)
14. Explain in detail the method for smoothening the image in frequency domain. (8) [D] (Nov/Dec 2016)
15. Discuss the following spatial enhancement techniques 1) Spatial averaging 2) median filtering. (8) [D]
16. Explain spatial filtering in image enhancement. (8) [D]
17. Explain Gradient operators for Image Enhancement(8) [D] (Nov/Dec 2016)
18. Explain Homomorphic filtering in detail. How it is used in correcting Non uniform illumination in an

images (15) [ID] (April/May 2018) (Dec'13) (May'14) (May'13)

19. Explain any two techniques for image enhancement (8) [D] (Dec '14)
20. How do you perform directional smoothing in images? Why it is required? (8) [D] (Dec '14)
21. Explain the types of gray level transformation used for image enhancement. (8) [D]
22. What are image sharpening filters? Explain the various types of it. (8) [D]

**Ideal, Butterworth and Gaussian filters.**

23. If a low pass filter is formed that averages the 4-neighbours of a point (x,y) but exclude point (x,y) itself. Find the equivalent filter function  $H(u,v)$  in the frequency domain. Show that it is a low pass filter. (8) [D] (April/May 2017)
24. Write short notes on ideal Butterworth filters and Gaussian filter. (8) [D]

**UNIT III**

**IMAGE RESTORATION AND SEGMENTATION**

**PART-A**

1. How the derivatives are obtained in edge detection during formulation? [ID] (April/May 2018)
2. How the discontinuity is detected in an image using segmentation? [ID] (April/May 2018)
3. Mention two drawbacks of inverse filtering? [D] (Nov/Dec 2017)
4. Which filter will be effective in minimizing the impact of "salt and pepper" noise in an image? [ID] (Nov/Dec 2017)
5. Why the restoration is called as unconstrained restoration? [D] (April/May 2017)
6. Define region growing .Give the principle of region growing. [D] (April/May 2017) (Dec'15)
7. State the causes of degradation in an image? [ID] [Nov/Dec 2016]
8. What do you understand by Mexican hat function? [ID] [Nov/Dec 2016]
9. Give the relation for Uniform noise and Impulse noise. [D] (April/May 2015)
10. What is Local threshold and dynamic or adaptive threshold, global thresholding? [ID] (April/May 2015)
11. How a degradation process is modeled? Or Define degradation model and sketch it. [D] (May'13)(May'15)
12. What is geometric transformation? [D] (June'12) (May'15)
13. What is meant by bit plane slicing? [D] (Dec'13)
14. Why blur is to be removed from images? [D] (Dec'14)
15. What is Lagrange multiplier? Where it is used? [D] (Dec'14)
16. Compare constrained and unconstrained restoration [D] (May'14)
17. What is the principle of inverse filtering? [D] (May'14)
18. Define rubber sheet transformation. [D] (May'13)
19. Define harmonic mean filter and contrast harmonic filter. [D] (May'14) (May'13)
20. What is segmentation? Write the applications of segmentation. [D] (Dec'13)

21. What are possible ways for adding noise in images? [ID] (Dec'14)
22. Give the relation between Gaussian noise and Rayleigh noise [ID] (May '13)
23. What is pseudo inverse filter? [D] (Dec'13)
24. What is meant by least mean square filter or wiener filter? [D] (Dec'12)
25. What is edge? What are the two properties used for establishing similarity of edge pixels? [D] (Dec'13)
26. State the problems in region splitting and merging based image segmentation. [ID] (Dec'14)
27. What are factors affecting the accuracy of region growing? [ID] (May'14)
28. Write sobel horizontal and vertical edge detection masks. [D] (May'13)
29. Define region splitting and merging. Specify the steps involved in splitting and merging [D] (May'14) (May'13)
30. Give the difference between Enhancement and Restoration [D]

**PART-B**  
**[FIRST HALF]**

**Order Statistics Filters**

1. Apply order statistics filters on the selected pixels in the image. [D] (4) (Nov/Dec 2016)

**Adaptive filters**

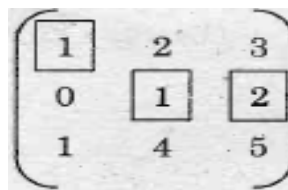
2. Explain adaptive filter? What are the two levels of adaptive median filtering algorithms? [D] (13) (April/May 2018)

**Inverse Filtering**

3. Describe the image restoration technique of inverse filtering. Why inverse filtering approach fails in the presence of noise? [D] (13) (Nov/Dec 2017)
4. What is meant by Inverse filtering? Explain it with equation. [D] (7) (April/May 2018) (Dec'13) (May'14) (Dec'15)

**Wiener filtering**

5. Derive a wiener filter for image restoration and specify its advantages over inverse filter. [D] (13) (April/May 2017)
6. What is meant by Weiner filtering for image restoration? [D] (6) (April/May 2018)
7. Explain how weiner filtering is used for image restoration [D] (4) (Nov/Dec 2016)



8. Explain wiener filter or least mean square filter in image restoration. [D] (8) (Dec'13)(Dec'14) (May'14) (May'13)(Dec'15)
9. How wiener filter is helpful to reduce the mean square error when image is corrupted by motion blur and additive noise? [ID] (8) (May'15)

## [SECOND HALF]

### **Region based segmentation**

10. What is the objective of image segmentation? Explain any one of the region based image segmentation technique in detail. Mention two applications of image segmentation. [ID] (13) (Nov/Dec 2017)
11. Explain region splitting and merging technique for image segmentation with suitable example. [D] (13) (April/May 2017)
12. Explain region based segmentation technique. [D] (4) (Nov/Dec 2016)
13. Explain region based segmentation and region growing with an example. [D] (8) (May'15)
14. Explain the two techniques of region segmentation. [D] (8) (May'14)
15. Explain region splitting and merging method of image segmentation. [D] (8) (Dec'15)
16. Discuss about region based image segmentation techniques. Compare threshold region based techniques. [D] (8) (May'13)

### **Edge Linking and Boundary detection**

17. Explain the process of edge linking using Hough transform. [D] (4) (Nov/Dec 2016)
18. Explain Edge Detection and edge linking in detail? [D] (8) (May'14)
19. What is gray level interpolation? Explain the schemes involved in it. [D] (8) (Dec'12)
20. Explain the causes for image degradation. [D] (8) (Dec'13)
21. Describe constrained least square filtering for image restoration and derive its transfer function. [ID] (8) (May'13)

## UNIT IV

### WAVELETS AND IMAGE COMPRESSION

#### PART-A

1. What are two main types of Data compression in DIP? (D) (April/May 2018)
2. What are different Compression Methods in image coding? (ID) (April/May 2018)
3. Mention the conditions for function to be called as wavelets. (ID) (Nov/Dec 2017)
4. When a code is said to be "prefix code"? Mention one advantage of prefix code. (ID) (Nov/Dec 2017)
5. What is run length coding?[D] (April/May 2017) (May'14) (Dec'15)
6. What are the operation performed by error free compression?[ID] (April/May 2017)
7. What is an image pyramid? [D] (Nov/Dec 2016)
8. State whether the given Huffman code 0, 10, 011 for the symbols a1, a2, a3, a4 is uniquely decodable or not? [ID] (Nov/Dec 2016)
9. Define coding redundancy [D] (Dec'15)
10. What is the need for Compression? Compare lossy and lossless compression technique [D] (May'14)(May'13)(May'15)



11. List the advantages of transform coding. [ID](May'15)
12. Define the procedure for Huffman shift coding [D] (Dec'12) (May'13)
13. Define Huffman coding and mention its limitation [D] (June'12 & (Dec'13))
14. What is bit plane Decomposition? [D] (Dec'13)
15. What is shift code? [D] (Dec'14)
16. Write the performance metrics for image compression. [ID] (Dec'14)
17. Define compression ratio. [D] (June'12)
18. What are the coding systems in JPEG? [ID] (Dec'12)
19. What is image compression? [D]
20. What is Data Compression? [D]
21. Define interpixel redundancy. [D]
22. What is JPEG? [D]
23. What are the basic steps in JPEG? [D]
24. What is MPEG? [D]
25. Define I-frame[D]
26. Define P-frame[D]
27. Define B-frame[D]
28. Define source encoder. [D]
29. Define encoder[D]
30. What is Variable Length Coding? [D]
31. Define Block code. [D]
32. Define arithmetic coding. [D]
33. Draw the block diagram of transform coding system. [D]

## PART – B

### [FIRST HALF]

#### Image Compression models

1. Explain how compression is achieved in transform coding and explain about DCT (D) (13) (April/May 2018) (May'14)
2. Explain two dimensional Discrete Wavelet transform (DWT) [D] (8) (Nov/Dec 2016)
3. Explain the need for image compression? How vector quantization used for compression? (ID) (13) (April/May 2018)
4. Explain about Image compression model. [D] (8)

#### Error Free Compression

5. Explain about Error free Compression and Lossy compression. [D] (8)

### **Variable Length Coding**

6. Construct Huffman code for the word “BABY”. Also compute the efficiency of Huffman code. **(ID) (13) (Nov/Dec 2017)**
7. What is image compression? Explain any four variable length coding compression schemes. **(Dec’13)**
8. With a neat block diagram, explain transform based image compression scheme. Also give two valid reasons for the choice of Discrete cosine transform in JPEG image compression standard. **(ID) (13) (April/May 2017)**
9. Encode the sentence “I LOVE IMAGE PROCESSING” using arithmetic coding procedure. **(ID) (13) (April/May 2017)**
10. Encode the word a1 a2 a3 a4 using arithmetic code and generate the tag for the given symbol with probabilities. **[ID] (8) (Nov/Dec 2016)**  
a1  $\rightarrow$ 0.2, a2  $\rightarrow$ 0.2, a3  $\rightarrow$ 0.4, a4  $\rightarrow$ 0.2
11. Discuss the need for image compression. Perform Huffman algorithm for the following intensity distribution, for a 64x64 image. Obtain the coding efficiency and compare with that of uniform length code. r<sub>0</sub>=1008, r<sub>1</sub>=320, r<sub>2</sub>=456, r<sub>3</sub>=686, r<sub>4</sub>=803, r<sub>5</sub>=105, r<sub>6</sub>=417, r<sub>7</sub>=301 **[ID] (8) (Dec’14)**

### **[SECOND HALF]**

#### **Lossless Predictive Coding, Lossy Predictive Coding**

12. Describe vector quantization with neat sketch. **[D] (8) (May’15)**
13. Describe run length encoding with examples. **[D] (8) (May’15)**

#### **Lossy Compression – Compression Standards.**

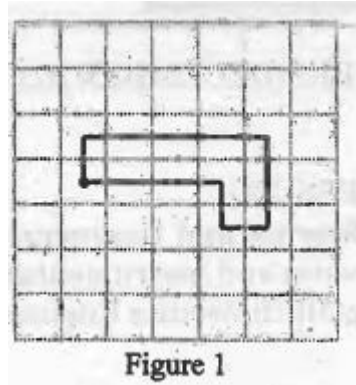
14. With a neat block diagram, explain transform based image compression schemes. Also mention different modes in JPEG compression standard. **(ID) (13) (Nov/Dec 2017)**
15. What is the need for data compression? Explain image compression standard in detail. **(D) (13) (Nov/Dec 2016)**
16. Explain the schematics of image compression standard JPEG. **[D] (8) (May’14)**
17. Explain the principle of arithmetic coding with an example. **[D] (8) (Dec’13) (May’14)(Dec’15)**
18. Draw and explain the block diagram of MPEG encoder **[D] (13) (Dec’12) (May’14)**
19. Write notes on i) Vector quantization ii)JPEG standard **[D] [8] (Dec’14)**
20. (i) Briefly explain transform coding with neat sketch. **(May’13)(May’15)**
21. A source emits letters from an alphabet A = {a<sub>1</sub> , a<sub>2</sub> , a<sub>3</sub> , a<sub>4</sub> , a<sub>5</sub>} with probabilities **[ID] (8) (Dec’15)**
  - a. P(a<sub>1</sub>) = 0.2 , P(a<sub>2</sub>) = 0.4 , P(a<sub>3</sub>) = 0.2 , P(a<sub>4</sub>) = 0.1 and P(a<sub>5</sub>) = 0.1.
  - b. (1) Find the Huffman code (2) Find the average length of the code and its redundancy.
22. Generate the tag for the sequence 1 3 2 1 for the probabilities P(1) = 0.8 ,P(2) = 0.02 ,P(3) = 0.18. **[ID] (8) (May’13)**
23. Draw and explain the block diagram of transform coding. **[D] (8) (Dec’15)**

## UNIT V

### IMAGE REPRESENTATION AND RECOGNITION

#### PART A

1. Define training pattern and training set [D] (April/May 2018)
2. Enumerate topological feature [D] (April/May 2018)
3. What is pattern and pattern class? [D] (Nov/Dec 2017)
4. Obtain 4 directional chain code for the shape shown in fig 1. The dot in the figure represents the chain code [ID] (Nov/Dec 2017)



5. What is meant by pattern class? {D} (April/May 2017)
6. Does the use of chain code compress the description information of an object contour? [ID] (Apr/May 2017)
7. What is thinning or skeletonizing algorithm? {ID} (Nov/Dec 2016)
8. Define texture. {ID} (Nov/Dec 2016)
9. Specify the various image representation approaches. [ID]
10. Define chain code. [D]
11. What are the demerits of chain code? [D]
12. What is polygonal approximation method? [D]
13. Specify the various polygonal approximation methods. [ID]
14. Name few boundary descriptors. [D]
15. Define length of a boundary. [D]
16. Give the formula for diameter of boundary [D]
17. Define eccentricity and curvature of boundary [D]
18. Define shape numbers. [D]
19. Describe Fourier descriptors [D]
20. Give the Fourier descriptors for the following transformations [ID]
21. Specify the types of regional descriptors [D]
22. Name few measures used as simple descriptors in region descriptors. [ID]
23. Define compactness. [D]
24. List the approaches to describe texture of a region. [ID]

25. What is pattern recognition? [D]
26. What are the three principle pattern arrangements? [D]
27. What is meant by markers? [D]
28. What are the 2 principles steps involved in marker selection? [D]
29. Describe statistical approach[D]
30. Define gray-level co-occurrence matrix. Explain structural and spectral approach. [ID]

## PART – B

### [FIRST HALF]

#### **Boundary representation, Signature, boundary segments**

1. Explain in detail any two boundary representation schemes and illustrate with examples. [D] (16)  
(Nov/Dec 2016)

#### **Chain Code, Polygonal approximation**

2. Explain chain code in detail with an example. [D] (13) (April/May 2018)
3. Explain Polygon approximations in detail. [D] (13) (April/May 2018)
4. a) Write short on the following image representation techniques [D] (15) (Nov/Dec 2017)
  - i) Chain code and
  - ii) Polygonal approximation.

#### **Boundary description**

5. Explain Boundary descriptors in detail with a neat diagram. [D] (16) (April/May 2017)
6. Define and explain the various representation approaches? [D]
7. Explain the two techniques of region representation[D] (8)

### [SECOND HALF]

#### **Fourier Descriptor**

8. Mention different techniques for the representation of shapes in a digital image. Explain the principle behind "Fourier Descriptor" based shape representation [D] (15) (April/May 2017)
9. Write short notes on Fourier descriptors. [D] (8)

#### **Regional Descriptors –Topological feature, Texture**

10. Write short notes on statistical, structural and spectral approach. [D] (8)
11. Write short notes on i)signature ii)Texture iii)Boundary segments[D] (8)
12. Explain in detail about regional descriptors[D] (8)

#### **Patterns and Pattern classes**

13. Explain in detail about pattern and pattern classes. [D] (8)
14. Explain in detail about three principle pattern arrangements. [D] (8)

### **Recognition based on Matching**

15. Explain image recognition based on matching. **[D] (15) (Nov/Dec 2016)**
16. Explain the different object recognition methods.**[D] (8)**
17. Explain the structural methods in object recognition.**[D] (8)**
18. Explain in detail about the object recognition technique based on matching. **[D] (16) (April/May 2017)**

\*\*\*\*\*ALL THE BEST\*\*\*\*\*