Time: 02 Hours **[Total Marks: 50]**

N.B: (1) **All questions are compulsory.**
(2) Figures to the **right** indicate full marks.
(3) **Assume additional data if necessary** but state the same clearly.
(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.
(5) **Draw suitable illustrations** wherever necessary.

Q.1	Attempt **any two** of the following	**(10)**
a)	Explain the concept of periodic signals. Provide examples of periodic signals and discuss their significance in digital signal processing.	**05**
b)	What is the difference between white noise, Brownian noise, pink noise, and Gaussian noise? What effect does noise have on signal and image processing?	**05**
c)	Define autocorrelation and explain its significance in signal and image processing	**05**
d)	Discuss the process of representing an image as a signal. How does sampling and the Fourier Transform contribute to this representation?	**05**
Q.2	Attempt **any two** of the following	**(10)**
a)	Define image processing and discuss its various applications in real-world scenarios. How does image processing enhance the quality and usability of images?	**05**
b)	Discuss intensity transformations in image processing. Explain the concepts of log transform, power-law transform, and contrast stretching with suitable examples.	**05**
c)	Describe the techniques used for linear and non-linear smoothing of images. How do these techniques differ in their approach to reducing noise and preserving image details?	**05**
d)	Define image derivatives and gradients. Explain the Laplacian operator and its role in edge detection.	**05**
Q.3	Attempt **any two** of the following	**(10)**
a)	Discuss the process of skeletonizing in morphological image processing. How does this technique reduce an image to its essential structure?	**05**
b)	Discuss the LoG (Laplacian of Gaussian) and DoG (Difference of Gaussian) filters. How are these filters used in edge detection, and what are their respective strengths and weaknesses?	**05**
c)	What are image pyramids, and why are they used in image processing? Explain the concepts of Gaussian Pyramid and Laplacian Pyramid.	**05**
d)	Define morphological image processing. Describe the operations of erosion and dilation and their effects on binary images.	**05**

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Q.4 Attempt **any two** of the following **(10)**

a) Describe the Harris Corner Detector. How does it detect corners in an image, and what makes it robust for corner detection? **05**

b) What is the Histogram of Oriented Gradients (HOG) method? Describe its application in feature extraction and object detection. **05**

c) Describe Haar-like features. How are these features used in object detection, particularly in the context of face recognition? **05**

d) Compare and contrast edge-based and region-based segmentation techniques. **05**

Q.5 Attempt **any two** of the following **(10)**

a) Compare and contrast the techniques of smoothing using lowpass filters and sharpening using high-pass filters. How does the Fast Fourier Transform (FFT) facilitate these operations? **05**

b) What is thresholding in image processing? Describe its importance and provide examples of how thresholding is used to segment images. **05**

c) What is the purpose of opening and closing operations in morphological image processing? Explain with suitable example. **05**

d) Explain the concept of Scale-Invariant Feature Transform (SIFT). How does SIFT achieve scale and rotation invariance in feature detection? **05**

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(Time :1 Hours) **[Total Marks: 25].**

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Q.1 Attempt **any two** of the following **(10)**

a) Define regular expression. Generate regular expression for the following statement. **05**
- (0+1) * 0
- (b* (aaa)* b*) *

b) List out drawbacks of top- down parser. Eliminate left recursion from the following production set. **05**

$S \rightarrow P$

$P \rightarrow Pd / Pe / aQ / ac$

$Q \rightarrow bQc / f$

c) Write a note on syntax analyzer generator YACC. **05**

d) Consider the grammar **05**

E –> 2E2
E –> 3E3
E –> 4

Perform Shift Reduce parsing for input string "32423"

Q.2 Attempt **any two** of the following **(10)**

a) What is Loop Optimization in Compiler Design? Perform induction variable elimination for the following three address code. **05**

i:= i+1
x:= 3*i
y:= a[x]
if y< 15, goto B2

b) What is activation record? Explain the activation record. **05**

c) Explain machine dependent and machine independent optimization techniques. **05**

d) Discuss debugging and testing process used in compilation. **05**

Q.3 Attempt **any one** of the following **(05)**

a) State the general form of Postfix and infix notation. convert the following infix expression to postfix form **05**

(A-B)*(C/D)$F
A+B/C$E+F*G

b) Explain the phases of compiler. **05**

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Time :2 ½ Hours **[Total Marks: 50]**

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(3) **Assume additional data if necessary** but state the same clearly.
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Q.1	Attempt **any two** of the following	**(10)**
a)	Explain any one Routing protocol in detail.	**05**
b)	Write a short note on Ad-hoc Networking.	**05**
c)	Discuss the Implementation of IPv6 along with their components.	**05**
d)	Explain encapsulation.	**05**
Q.2	Attempt **any two** of the following	**(10)**
a)	Write a short note on SDN Data Plane.	**05**
b)	Discuss Openflow in detail with example.	**05**
c)	Explain Opendaylight architecture.	**05**
d)	Explain key elements in unified communication.	**05**
Q.3	Attempt **any two** of the following	**(10)**
a)	How SDN helps in working architecture of Cloud Computing?	**05**
b)	Explain the disadvantages of SDN Virtualization.	**05**
c)	State and Explain working of IoT Components with respect to Software Defined Networking	**05**
d)	Write a short note on NFV along with domain component.	**05**
Q.4	Attempt **any two** of the following	**(10)**
a)	Discuss BGP implementation with example.	**05**
b)	State and Explain MPLS implementation.	**05**
c)	Write a short note on Traffic filtering by Extended Access Control List.	**05**
d)	Explain Policy based routing in detail.	**05**
Q.5	Attempt **any two** of the following	**(10)**
a)	State and Explain the any five differences between LAN and MAN.	**05**
b)	What are different elements of Modern Technology? Explain any One in detail.	**05**
c)	Write a short note on Fog Computing.	**05**
d)	How does hello message help in OSPF?	**05**

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