Year - April 2024

MSC - CS

SEM - I

No. of pages - 6

Paper / Subject Code: N57711 / Applied Signal &Image Processing

MSC-IS- NEP2020 Sem I

Time :2 ½ 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.

Q.1	Attempt **any two** of the following	**(10)**
a)	Briefly discuss about various types of noise and its effect in Signal and Image processing.	**05**
b)	Define Correlation. How it useful in signal and image analysis.	**05**
c)	Write a note on representing image as signal.	**05**
d)	List and explain applications of digital signal processing.	**05**
Q.2	Attempt **any two** of the following	**(10)**
a)	Compare log and power law transformation on the image.	**05**
b)	Explain how histogram processing is useful in image processing. Explain the terms histogram equalization and histogram matching.	**05**
c)	Write a note on non-linear smoothing of images. Give example to explain the concept.	**05**
d)	Explain what is Contrast Stretching? How it is used to enhance images.	**05**
Q.3	Attempt **any two** of the following	**(10)**
a)	List and explain Sobel and Prewitt edge detectors.	**05**
b)	Briefly what are image pyramids? Also explain briefly Gaussian Pyramid.	**05**
c)	Explain morphological opening and closing operations. What are its merits over erosion and dilation operations?	**05**
d)	Briefly explain how we can extract boundary of an object in an image.	**05**
Q.4	Attempt **any two** of the following	**(10)**
a)	Briefly explain about scale-invariant feature transformations and its significance in image processing.	**05**
b)	What is Haar-like Feature? Discuss in detail its use in image processing and analysis.	**05**
c)	Write a brief note about the concept of using watershed algorithm for segmentation.	**05**
d)	Write a note on GrabCut algorithm in Image Processing.	**05**
Q.5	Attempt **any two** of the following	**(10)**
a)	What is the effect of applying Laplacian on an image? Where is it used?	**05**
b)	Write a note on LoG and DoG filters.	**05**
c)	Define Skeletonization. Explain the operations and use of structuring elements in skeletonizing the given object structure.	**05**
d)	Define Thresholding. Explain adaptive thresholding technique.	**05**

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MSC - CS - Sem I -

(2 ½ Hours) [Total Marks: 60]

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Q.1	Attempt **any two** of the following	**(12)**
a)	Explain the function of NAT with suitable example.	**6**
b)	Explain various timers in RIP.	**6**
c)	Explain the various transport layer services.	**6**
d)	Explain the TCP/IP Protocol Suite.	**6**
Q.2	Attempt **any two** of the following	**(12)**
a)	Explain the networking ecosystem.	**6**
b)	Explain the techniques of congestion control.	**6**
c)	Explain the requirements for SDN in modern networking.	**6**
d)	Explain various functions of SDN controller.	**6**
Q.3	Attempt **any two** of the following	**(12)**
a)	Explain various service models in cloud computing.	**6**
b)	Explain components of IoT.	**6**
c)	Explain various requirements of NFV.	**6**
d)	Explain the function of data plane in QoS architectural framework.	**6**
Q.4	Attempt **any two** of the following	**(12)**
a)	What is MPLS? Explain its advantages and disadvantages.	**6**
b)	Explain OSPF packet header.	**6**
c)	Explain various characteristics of BGP.	**6**
d)	Explain routing redistribution with proper example.	**6**
Q.5	Attempt **any two** of the following	**(12)**
a)	Explain socket data structure.	**6**
b)	Explain three-layer convergence model of enterprise communication.	**6**
c)	Explain NIST cloud computing reference architecture.	**6**
d)	Explain ACL and its types.	**6**

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MSC - CS - Sem I

Time : 2 ½ Hours | Total Marks : 60

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Q.1	Attempt **any two** of the following	**(12)**
a)	Discuss design optimization process and basic optimization problem.	**6**
b)	What are local minima? What are different types of local minima?	**6**
c)	What do you mean by brackets? How we can find initial brackets.	**6**
d)	Write a note on Fibonacci series.	**6**
Q.2	Attempt **any two** of the following	**(12)**
a)	Explain concept of Gradient descent in detail.	**6**
b)	Discus Adadelt and RMSProp in detail.	**6**
c)	Give the difference between first order method and second order method.	**6**
d)	Write a note on Newton's Method and Quasi- Newton Method.	**6**
Q.3	Attempt **any two** of the following	**(12)**
a)	Explain the concept of full factorial sampling plan with its algorithm.	**6**
b)	Write a note on Stratified Sampling.	**6**
c)	Explain the concept of Surrogate Model. How to fit surrogate model to any true objective function?	**6**
d)	Write a note on Gaussian process.	**6**
Q.4	Attempt **any two** of the following	**(12)**
a)	What is Uncertainty? What are different types of Uncertainty?	**6**
b)	Explain Bayesian Monte Carlo integration.	**6**
c)	Explain Ant Colony Optimization algorithm.	**6**
d)	Define Grammar with example.	**6**
Q.5	Attempt **any two** of the following	**(12)**
a)	What do you mean by critical point? What are types to optimize the process?	**6**
b)	Explain hyper gradient descent.	**6**
c)	What is sampling plan?	**6**
d)	How genetic programming implemented with Tree?	**6**

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Time :2 ½ Hours [Total Marks: 50]

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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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MSC & MSC (research) (choice based) sem I

(5)

Paper / Subject Code: 94744 / Computer Science: Algorithms for Optimization (R-2021-22)

Time : 2 ½ Hours

Total Marks : 60

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Q.1	Attempt **any two** of the following	(12)
a)	Discuss design optimization process and basic optimization problem.	6
b)	What are local minima? What are different types of local minima?	6
c)	What do you mean by brackets? How we can find initial brackets.	6
d)	Write a note on Fibonacci series.	6
Q.2	Attempt **any two** of the following	(12)
a)	Explain concept of Gradient descent in detail.	6
b)	Discus Adadelt and RMSProp in detail.	6
c)	Give the difference between first order method and second order method.	6
d)	Write a note on Newton's Method and Quasi- Newton Method.	6
Q.3	Attempt **any two** of the following	(12)
a)	Explain the concept of full factorial sampling plan with its algorithm.	6
b)	Write a note on Stratified Sampling.	6
c)	Explain the concept of Surrogate Model. How to fit surrogate model to any true objective function?	6
d)	Write a note on Gaussian process.	6
Q.4	Attempt **any two** of the following	(12)
a)	What is Uncertainty? What are different types of Uncertainty?	6
b)	Explain Bayesian Monte Carlo integration.	6
c)	Explain Ant Colony Optimization algorithm.	6
d)	Define Grammar with example.	6
Q.5	Attempt **any two** of the following	(12)
a)	What do you mean by critical point? What are types to optimize the process?	6
b)	Explain hyper gradient descent.	6
c)	What is sampling plan?	6
d)	How genetic programming implemented with Tree?	6

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Paper / Subject Code: N57791 / Research Methodology

MSc - CS - NEP 2020 - Sem I

Time :2 Hours [Total Marks: 50]

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Q.1 Attempt **any two** of the following **(10)**
a) Define Research. Explain the role of Research in Computer Science
b) State and explain the steps involved in Research Process
c) Discus the characteristics of a Good Literature Review.
d) Write a short note on Grounded Theory Research.

Q.2 Attempt **any two** of the following **(10)**
a) Write a short note on Data Collection Development Plan.
b) Explain the API Data Collection Method in detail.
c) How is Primary data different from secondary data with respect to research design?
d) Discuss Open Ended Surveys as a Qualitative Data Collection method for Research.

Q.3 Attempt **any two** of the following **(10)**
a) Discuss the different types of Data Analysis.
b) Write a short note on Data Visualization Tools.
c) What is Exploratory Data Analysis (EDA)? Explain in brief.
d) How to draw valid conclusions in research? Discuss.

Q.4 Attempt **any two** of the following **(10)**
a) Explain the structure of a research paper.
b) Discuss the guidelines for preparing effective research presentations.
c) Explain in detail the steps involved in Peer Review process.
d) What is the significance of et.al in citation? Explain with example.

Q.5 Attempt **any two** of the following **(10)**
a) Discus the characteristics of a Good Literature Review.
b) Explain the Ethical Considerations for Data Collection for Research.
c) What is the use of Inferential Statistics in Research? Explain.
d) Write a short note on Key Components of Confidentiality in Research.

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