

TY-BSc. CS Sem-VI 12/4/23

(2 ½ Hours)

[Total Marks: 75]

- N.B. 1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All

- (a) Select the correct alternative from the options given: (10M)
- (i) Data in WSN is transmitted by _____ connectivity.
(a) Wireless (b) Wired
(c) Both a and b (d) None of these
- (ii) Similarities between WSNs and MANETs networks is _____.
(a) nodes are densely deployed (b) the nodes communicate each other using multi-hop communication
(c) topology changes very frequently (d) have global unique identification for nodes
- (iii) Which protocol assigns an IP address to the client connected to the internet?
(a) DHCP (b) IP
(c) RPC (d) RSVP
- (iv) Which of the following constraints depend on the cost and size of the sensor in WSN?
(a) Energy (b) Memory
(c) Speed (d) All of these
- (v) Wireless sensor not uses following entity in architecture _____
(a) Processor (b) Storage
(c) Power Unit (d) Resource Management
- (vi) RTS/CTS period is called _____.
(a) waiting period (b) contention period
(c) running period (d) none of these
- (vii) The radio communication spectrum is divided into bands based on _____.
(a) Frequency (b) cost and hardware
(c) transmission media (d) amplitude

- (viii) Optimization of wireless sensor network is based on _____
(a) Quality Of Service (b) Energy Efficiency
(c) Scalability (d) all of above
- (ix) A star network is implemented using _____ distribution paradigm in computer networks.
(a) Spoke hub (b) Mesh
(c) Triangle (d) none of these
- (x) A sensor node with a processing unit has _____ computational power.
(a) Limited (b) Minimum
(c) Maximum (d) Zero

(b) Fill in the blanks by selecting from the pool of options: (5M)

(frequency, cluster head, pure aloha, data & node / node & data, antenna)

- (i) The radio communication spectrum is divided into bands based on _____.
- (ii) In _____ each station sends a frame whenever it has a frame to send.
- (iii) The _____ is designed to radiate the aura of the electromagnetic field created by the electric current.
- (iv) The more capable nodes can naturally play the role of _____.
- (v) Network for sensor networks is _____centric but not _____centric.

Q.2 Attempt the following (Any THREE) (15M)

- (a) State the reasons why gateways are needed in WSN.
- (b) What is a Wireless Sensor Networks and its application?
- (c) Discuss on Issues and Challenges in Designing a Sensor Networks?
- (d) What are the characteristics of an ideal routing-protocol for Adhoc networks?
- (e) Explain about mobile adhoc network with a neat diagram?
- (f) In Wireless Sensor Networks, state the three types of Mobility.

Q.3 Attempt the following (Any THREE) (15M)

- (a) What are Requirements and design constraints for wireless MAC protocols.
- (b) What is Low Energy Adaptive Clustering Hierarchy? State its advantages and disadvantages.
- (c) Explain in brief common MAC protocols used in WSN.
- (d) List and explain components of Sensor MAC.
- (e) Discuss issues in designing MAC protocol for adhoc-networks.
- (f) Explain directional busy-tone-based MAC protocol in detail.

Q. 4 Attempt the following (Any THREE) (15)

- (a) What are the application of satellite communication?
- (b) Explain different types of satellite orbits with suitable diagram.
- (c) Write a note of GSM security services.
- (d) Gives an overview of the frequency spectrum that can be used for data transmission.
- (e) Explain signal propagation using different types of antenna.
- (f) Explain satellite system for global mobile telecommunications.

Q. 5 Attempt the following (Any FIVE) (15)

- (a) How to turn relatively imprecise optimization goals into measurable figures of merit for sensor node network?
- (b) Explain Single-Hop versus Multi-Hop Networks.
- (c) Explain Inclination angle of a satellite with suitable diagram.
- (d) Explain DECT system architecture with suitable diagram.
- (e) Explain Routing Strategies in Wireless Sensor Networks.
- (f) What are the Transport Protocol Design Issues?
- (g) Give the examples existing Transport Control Protocols for WSN.
- (h) Write a short note on WSN tunnelling.

(2 1/2 Hours)

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Q. 1 Attempt All

(a) Select the correct alternative from the options given: (10M)

(i) Cloud Computing is a paradigm of _____ to provide the customers on-demand, utility-based computing service.

- (a) Distributed computing (b) Undistributed Computing
(c) Centralized Computing (d) Central Computing

(ii) _____ serves as a PaaS vendor within Google App Engine system.

- (a) Amazon (b) Microsoft
(c) Hadoop (d) Google

(iii) Which one of these is not a cloud computing pricing model?

- (a) Free (b) Pay Per Use
(c) Subscription (d) Ladder

(iv) Hypervisor runs at the top of hardware

- (a) Type - I (b) Type - II
(c) Type - III (d) Type - IV

(v) Creating more logical IT resources, within one physical system is called _____

- (a) Load balancing (b) Hypervisor
(c) Virtualization (d) Operating System

(vi) What is most commonly used for managing the resources for every virtual system?

- (a) Load balancer (b) Hypervisor
(c) Router (d) Cloud

(vii) In virtualization where an array of servers that are managed by a virtual storage system is _____

- (a) Application Virtualization (b) Desktop Virtualization
(c) Network Virtualization (d) Storage Virtualization

- (viii) Which open stack's component is called as a swift?
(a) Image Service (b) Dashboard
(c) Object Storage (d) Identity
- (ix) Which component serves as a dashboard for users to manage OpenStack compute, storage and networking services?
(a) Designate (b) Horizon
(c) Glance (d) Searchlight
- (x) Which OpenStack component provides identity services?
(a) Trove (b) Dragon flow
(c) Ceilometer (d) Keystone
- (b) **Fill in the blanks by selecting from the pool of options:** (5M)
(Network, Abstraction, Stack, Heat, Client, Communication, Cloud Provider, Storage, Glance)
- (i) _____ is the core orchestration component with OpenStack
- (ii) _____ is an essential concept related to Cloud.
- (iii) _____ is not a cloud stakeholder.
- (iv) _____ virtualization has the ability to run multiple virtual networks with each has a separate control and data plan.
- (v) _____ component provides image services for creating VMs in Open Stack.

Q. 2 Attempt the following (Any THREE) (15M)

- (a) Explain cloud computing reference model with a neat diagram.
(b) How is Grid Computing different from Cloud Computing? Elaborate.
(c) What is utility oriented computing? Explain.
(d) Explain the cloud deployment models, in detail.
(e) Briefly explain the Client/Server architectural style.
(f) List and explain the models for message-based communication.

Q. 3 Attempt the following (Any THREE) (15M)

- (a) Explain Storage, Network and Desktop virtualization techniques.
(b) What is a hypervisor? Explain the different types of hypervisors with a neat diagram
(c) Explain the pros and cons of virtualization.

- (d) Compare Full and para virtualization.
- (e) Define virtualization and describe its benefits.
- (f) List and define the security rings of virtualization.

Q. 4 Attempt the following (Any THREE) (15)

- (a) Explain the architecture of Nova.
- (b) Explain the types of storage provided by OpenStack.
- (c) Explain Orchestration Service in OpenStack
- (d) Explain Open Stack Operation in detail.
- (e) What is Devstack? Write the steps to install Devstack.
- (f) Explain Tenant Model Operation in Open Stack

Q. 5 Attempt the following (Any FIVE) (15)

- (a) List the types of Cloud. Write about anyone.
- (b) What is Desktop Virtualization, write in brief?
- (c) Write three differences between Cloud Computing and Virtualization.
- (d) What is oVirt?
- (e) Write any three advantages of Distributed System.
- (f) Write a short note on QoS.
- (g) What is Open Stack?
- (h) What is AWS?

18/4/23

(2 ½ Hours)

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Q. 1 Attempt All**(a) Select the correct alternative from the options given: (10M)**

- (i) Information retrieval is querying of _____ textual data.
 (a) Structured (b) Unstructured
 (c) Formatted (d) Unformatted
- (ii) _____ is what fraction of the relevant documents in the collection were returned by the system.
 (a) Index (b) Inverted index
 (c) Precision (d) Recall
- (iii) In a _____, the dictionary contains all k-grams that occur in any term in the vocabulary.
 (a) Indexing (b) Permuterm index
 (c) Permuterm (d) k-gram index
- (iv) Which of the following is a technique for context sensitive spelling correction?
 (a) The Jaccard Coefficient (b) Soundex algorithms
 (c) Levenshtein distance (d) k-gram indexes
- (v) _____ takes a set of data and converts it into another set of data, where individual elements are broken down into tuples (key/value pairs).
 (a) Map (b) Reduce
 (c) Map Reduce (d) Collections
- (vi) _____ in Information retrieval are short fragments of text extracted from the document content or its metadata.
 (a) snippets (b) question answering
 (c) long document (d) metadata of document
- (vii) _____ problem means that there is a need to be enough other users already in the system to find a match
 (a) unique taste (b) active users
 (c) sparsity (d) Cold start
- (viii) _____ approaches are commonly used for data collections with complex structures that mainly contain nontext data.
 (a) document-centric (b) data-centric
 (c) text-centric (d) query-centric

- (ix) The standard for accessing and processing XML documents is the XML _____
 (a) Document Oriented Model (b) Database Object Model
 (c) Data Object Model (d) Document Object Model
- (x) _____ refers to a huge database of internet resources such as web pages, newsgroups, programs, images etc.
 (a) result page (b) search engine
 (c) database (d) web crawler
- (b) Fill in the blanks by selecting from the pool of options: (5M)
 (Vector Space Model, Xtensible Markup Language, Extensible Markup Language, collaborative filtering, Hyperlink, SEO, Levenshtein distance, hub, authority, surface web, query suggestion)
- (i) When we replace a character of a string by another character, it is called as _____
- (ii) A good _____ page for a topic links to many authority pages for that topic
- (iii) _____ forms a directed edge from one node to another node in a web graph
- (iv) XML stands for _____
- (v) _____ is the algebraic model for representing text documents as vectors of identifiers
- Q. 2 Attempt the following (Any THREE) (15M)**
- (a) Explain inverted index used in IR with the help of an example.
- (b) Explain the following terms
 i) Corpus
 ii) Precision
 iii) Recall
 iv) Stop words
 v) Token
- (c) Draw the term document incidence matrix for the following document collection and answer the given queries
 Doc 1 new home sales top forecasts
 Doc 2 home sales rise in july
 Doc 3 increase in home sales in july
 Doc 4 july new home sales rise
 i) Home and sales and july
 ii) Rise and sales not increase
- (d) Explain the search process using Binary tree.
- (e) Explain the SOUNDIX algorithm used in Phonetic correction
- (f) What is spelling correction? State and explain its different forms.
- Q. 3 Attempt the following (Any THREE) (15M)**
- (a) Explain hubs and authorities in detail.
- (b) How page rank algorithm is used for ranking web pages?
- (c) Explain how term frequency and inverse document frequency can be used in ranking web pages?

- (d) Explain the HDFS architecture.
- (e) State the advantages and disadvantages of personalized search.
- (f) What is snippet? Explain its importance in information retrieval.

Q. 4 Attempt the following (Any THREE) (15)

- (a) Explain the following terms in SPAM.
 - i) Content hiding
 - ii) Cloaking
 - iii) Redirection
 - iv) URL spamming
 - v) Term spamming
- (b) What is user query? State and explain the different types of queries entered by the user.
- (c) What is Web search architecture? Explain its components.
- (d) How Vector space model is used for information retrieval?
- (e) Explain the Data Centric XML retrieval with the help of examples.
- (f) What is XML retrieval system? State and explain the challenges of XML.

Q. 5 Attempt the following (Any FIVE) (15)

- (a) State the challenges in information retrieval.
 - (b) Compute the Edit distance to convert CATS to FATS.
 - (c) Explain invisible web.
 - (d) What is the need of question answering system?
 - (e) What is Collaborative filtering?
 - (f) Explain the indexing process in search engine.
 - (g) Explain the following:
 - i) Web graph
 - ii) Static web pages
 - iii) Web size
 - (h) What is black hat SEO?
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Q.1 Attempt All

- (a) Select the correct alternative from the options given: (10M)
- (i) Which of the following transform is separable?
 (a) Fourier transform (b) DFT
 (c) Walsh transform (d) Haar transform
- (ii) The photosensitive detector of the human eye is the _____.
 (a) Retina (b) Cornea
 (c) Iris (d) Eyelens
- (iii) Which of the following two values used by Walsh function.
 (a) +1 or -1 (b) $\sqrt{2}$ or $-\sqrt{2}$
 (c) $1/\sqrt{2}$ or $-1/\sqrt{2}$ (d) -2 or +2
- (iv) Increase the size of the mask results in _____ of the image.
 (a) Less blurring (b) More blurring
 (c) Improvement (d) Sharpening
- (v) Erosion operation is used to remove the _____ pixels.
 (a) Object (b) Background
 (c) Foreground (d) Image
- (vi) An image can be expanded by _____ operation.
 (a) Zooming (b) Dilation
 (c) Erosion (d) Subtraction
- (vii) _____ are memory less operations.
 (a) Mask operations (b) Global operations
 (c) Point operations (d) Dynamic operations
- (viii) A gradient operator for edge detection is _____.
 (a) Roberts (b) First order derivative
 (c) Second order derivative (d) Zero crossing derivative
- (ix) Compressed image can be recovered back by _____.
 (a) Image enhancement (b) Image contrast
 (c) Image decompression (d) Image recovery

- (x) Zigzag scan is employed in _____
- (a) Lossless compression (b) Jpeg compression
(c) Lossy compression (d) Statistical compression
- (b) Fill in the blanks by selecting from the pool of options: (5M)
(pixel, mask, printers, monitors, periodic, exponential, Intensity, Frames, Robert operator, Prewitt operator)
- (i) Structuring element is a _____.
- (ii) Additive colour formation is employed in _____.
- (iii) $X(n_1, n_2) = x(n_1 + N, n_2)$ is equation used for _____ sequence.
- (iv) Every run length pair introduces new _____.
- (v) Classical edge detector uses _____.

Q. 2 Attempt the following (Any THREE) (15M)

- (a) Describe the KL transform.
- (b) Perform the 2D linear cross correlation process on the following matrices.
 $x_1(m, n) = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$ $x_2(m, n) = \begin{bmatrix} 1 & 5 \\ 2 & 3 \end{bmatrix}$
- (c) Explain the image sampling and image quantization process.
- (d) List and explain the classification of the 2D system.
- (e) What are the applications of Digital Image Processing? (any five)
- (f) Discuss Hadamard transform. Derive Hadamard matrix for $N=8$.

Q. 3 Attempt the following (Any THREE) (15M)

- (a) Discuss following colour models.
 i) CMYK model
 ii) HIS model
- (b) List different ways to obtain binary image using different enhancement technique. Explain any two of them.
- (c) Perform Histogram equalization on following matrix.
 $\begin{matrix} 4 & 4 & 4 & 4 \\ 3 & 4 & 5 & 4 \\ 3 & 5 & 5 & 3 \\ 3 & 4 & 5 & 4 \\ 4 & 4 & 4 & 4 \end{matrix}$
- (d) Describe the Alpha blending. Compare Alpha blending with image arithmetic.
- (e) Explain Gaussian filter with reference to image enhancement.

- (f) Explain morphological operations on the binary image.
Discuss following colour models.
- i) CMYK model
 - ii) HIS model

Q. 4 Attempt the following (Any THREE) (15)

- (a) Discuss the various algorithm used for edge linking through Heuristic approach.
- (b) Explain the region splitting and merging approach in Image Segmentation.
- (c) What is Partitional clustering? Compare K-means clustering and Fuzzy clustering.
- (d) Generate the non binary Huffman code for the word 'COMMITTEE'.
- (e) Write a note on Transform based compression.
- (f) Describe the classification of redundancy.

Q. 5 Attempt the following (Any FIVE) (15)

- (a) Write a note on Line Impulse sequence.
- (b) What is resolution? Explain two types of resolution.
- (c) Describe Negative transformation.
- (d) What is distance transform? Explain Euclidean distance.
- (e) Explain human perceptron of colour.
- (f) List various JPEG mode. Explain any two modes of it.
- (g) Draw and explain any three types of edges.
- (h) Discuss Laplacian of Gaussian.

(2 ½ Hours)

[Total Marks: 75]

20/4/23

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Q.1 Attempt All

(a) Select the correct alternative from the options given: (10M)

- (i) Exploratory Data Analysis represents data in _____ format.
 (a) Numerical (b) Character
 (c) String (d) Graphical
- (ii) _____ interviews are conducted by a trained interviewer in a non-structured and natural way with a small group.
 (a) focus group (b) observation
 (c) formal (d) informal
- (iii) Imputation or removal of data are used during handling of _____ data.
 (a) collected (b) Missing
 (c) table (d) Duplicate
- (iv) _____ is a query language used for traversing through an XML document.
 (a) XML (b) TQML
 (c) Xquery (d) Xpath
- (v) _____ data have semantic tags.
 (a) structured (b) unstructured
 (c) semi structured (d) unorganised
- (vi) In version control _____ is a mainline or unique line of the development which is not actually a branch.
 (a) sub branch (b) trunk
 (c) path (d) root
- (vii) _____ service of cloud support services such as storage and network connectivity on demand.
 (a) IaaS (b) PaaS
 (c) SaaS (d) SaaS
- (viii) AIC is suited over BIC when the model is _____.
 (a) simple (b) complex
 (c) large (d) Small

(ix) Lasso regression was introduced in order to improve the prediction _____ and interpretability.

- (a) accuracy (b) values
(c) result (d) set

(x) _____ is the process of making prediction of the future based on present and past data.

- (a) Trend (b) Seasonality
(c) forecasting (d) classification

(b) Fill in the blanks by selecting from the pool of options: (5M)
(aggregation, unstructured, discrete, disguised, supervised, personal, unsupervised, smoothing, structured, continuous)

(i) Apriori, K-means and K-medoids are the example of _____ learning algorithm.

(ii) _____ deals with removal of noise from data.

(iii) _____ data are not organized into special repositories.

(iv) In _____ observation the person who is being observed is unaware that he is being observed.

(v) Height and weight are the example of _____ data.

Q. 2 Attempt the following (Any THREE) (15M)

- (a) What is data? Explain types of data.
(b) What is EDA? Explain methods to visualize data.
(c) What is data normalization? Illustrate any one type of data normalization technique with an example.
(d) Explain the difference between data and information.
(e) Describe any two types of observational methods used in data collection.
(f) Write a short note on data cleaning and data extraction.

Q. 3 Attempt the following (Any THREE) (15M)

- (a) Discuss the 5 V's of data.
(b) What is MongoDB? State its features.
(c) How to create indexes in MongoDB? Give example.
(d) What is NoSQL? What are its features?
(e) Explain how you can read JSON file in R with the help of an example.
(f) Write a short note on AWS.

- Q. 4 Attempt the following (Any THREE) (15)**
- (a) What are AIC, BIC? State their mathematical formula.
 - (b) Explain Forecasting. List the steps in forecasting.
 - (c) Write a short note on SVM.
 - (d) What is K-NN? Explain with the help of an example.
 - (e) Explain the filter method and forward selection method of data selection.
 - (f) Discuss the steps involved in implementing PCA on a 2-D Dataset.

- Q. 5 Attempt the following (Any FIVE) (15)**
- (a) Explain the terms data, information and knowledge.
 - (b) Write a short note on Smoothing by means technique.
 - (c) How can you see data stored in MongoDB? Explain any two methods with example.
 - (d) Explain any 3 ways to do web scraping.
 - (e) Discuss the important characteristics of HBase.
 - (f) Give the formula for Information Gain and Entropy.
 - (g) Discuss Model, Train Data and Test Data.
 - (h) Discuss the Advantages of Dimensionality reduction.

TY-BSc-CS

21/4/23

(2 ½ Hours)

[Total Marks: 75]

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Q. 1 Attempt All

- (a) Select the correct alternative from the options given: (10M)
- (i) Trojan Horse is an example of?
 (a) Antivirus (b) Malware
 (c) Attack (d) Virus
- (ii) The act of gathering information about target system is called _____.
 (a) Social Gathering (b) Reconnaissance
 (c) Stealing (d) Repudiation
- (iii) ARP Poisoning is an example of what type of attack?
 (a) Man in the middle (b) DOS
 (c) Brute-force attack (d) DDOS
- (iv) A Framework which is a collection of shell codes, exploits and payload is called?
 (a) Simple (b) .NET
 (c) Metasploit (d) Complex
- (v) Which of the following is a system designed to attract and identify hackers?
 (a) Honeypot (b) Firewall
 (c) Bootstrap (d) IDS
- (vi) _____ is done to make users access a spoof website rather than the intended destination.
 (a) DOS (b) URL Obfuscation
 (c) DDOS (d) Eavesdropping
- (vii) Which of the following is not a type of Ethical Hacker?
 (a) Grey (b) Black
 (c) Red (d) White
- (viii) Online purchase recommends websites beginning with https Protocol. This is referred as _____.
 (a) Security lab (b) firewall
 (c) Secure socket layer (d) Encryption

- (ix) _____ is an action that compromises security in a system
(a) Threat (b) Attack
(c) Exploit (d) Vulnerability
- (x) The main purpose of penetration test is to?
(a) Identify Vulnerabilities (b) Steal sensitive data
(c) Fix vulnerabilities (d) Exploit vulnerabilities
- (b) Fill in the blanks by selecting from the pool of options: (5M)
(NMAP, SYN ACK, Privilege escalation, Exploit, IP)
- (i) A DNS Translates domain name to _____
- (ii) The _____ command attacks the Target machine
- (iii) SYN packet is always followed by _____
- (iv) The _____ tool helps to scan a Network
- (v) The process of getting elevated access to the resource is called _____

Q. 2 Attempt the following (Any THREE) (15M)

- (a) Explain the terms authentication and authorization in Security
(b) Describe the Security, Functionality, and Ease of Use Triangle.
(c) What is a CSRF attack and how it is done?
(d) Explain the term Keystroke logging
(e) Write a short note on URL Obfuscation
(f) Give a complete description of Rootkits with example

Q. 3 Attempt the following (Any THREE) (15M)

- (a) Bringout the differences between Manual and Automated Penetration Testing.
(b) Write a short note on Session Hijacking
(c) What is meant by packet sniffing.? Explain
(d) Explain Crawling/Spidering with example
(e) Describe the terms Internal and External Penetration testing
(f) Define Ethical Hacking and explain its need.?

Q. 4 Attempt the following (Any THREE) (15)

- (a) Explain the term SYN Flooding.
(b) Write short note on VOIP Vulnerabilities.
(c) Explain SQL Injection attack
(d) What are the ways to achieve Mobile apps Security.? Explain
(e) Describe Honey pots and Evasion techniques
(f) Explain a Smurf Attack

- Q. 5 Attempt the following (Any FIVE) (15)
- (a) Define spyware and give example
 - (b) Explain the term Cookie Theft
 - (c) Define Black, Grey and white box penetration testing
 - (d) Define Scanning and mention its three types
 - (e) What is Buffer overflow
 - (f) Describe the term Steganography
 - (g) Define IP Spoofing
 - (h) What is XSS?
