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Paper 1 - Wireless Sensor Network	
Unit 1	1. Discuss the issues in designing a Wireless Sensor Network. 2. What are the characteristic requirements of Wireless Sensor Network? 3. State the applications of Wireless Sensor Networks. 4. Write a short note on advantages of Wireless Sensor Networks. 5. What is a MANET? Discuss important characteristic of MANETs. 6. Differentiate between MANETs and Wireless Sensor Networks. 7. List and explain components of basic sensor node. 8. Discuss the 4 different types of controllers. 9. State and explain any 5 characteristics of Transceiver. 10. What are the transceiver operational states? 11. In Wireless Sensor Networks, state the three types of Mobility. 12. Write a short note on 4 aspects of optimization goals, 13. List and explain any 5 basic principles for designing network protocols. 14. What are the requirements for WSN service interfaces? 15. State the reasons why gateways are needed in WSN.
Unit 2	1. State any 5 performance requirements while designing the MAC protocol for WSN. 2. Explain in brief any 5 common MAC protocols used in WSN. 3. Write a short note on Self Organizing MAC for Sensor Networks (SMACS). 4. What is Low Energy Adaptive Clustering Hierarchy(LEACH)? State its advantages and disadvantages. 5. List and explain any 5 components of Sensor MAC (S-MAC). 6. Discuss the advantages of Multi-Hop approach. 7. State the design issues and routing challenges in sensor networks. 8. Explain different routing strategies of routing. 9. Explain TCP operation. 10. Explain feasibility of using TCP/UDP for WSN. 11. Explain SPIN.
Unit 3	1. Explain the steps of Spread Spectrum. 2. What are the advantages and disadvantages of cellular systems? 3. What are the different applications of mobile communication? 4. Write short note on Signal Propagation. 5. Different effects of Signal Propagation.

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	6. What are the different features of GSM? Explain any 2 7. Write short note on TETRA. 8. What is LEO, MEO and GEO? 9. What is DECT? 10. Explain system architecture of DECT. 11. Explain protocol architecture of DECT. 12. Explain Multiplexing in mobile communication brief.

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Paper 2 - Cloud Computing	
Unit 1	1) What is the innovative characteristic of cloud computing? What is the major advantage of cloud computing? 2) Which are the technologies on which cloud computing relies? 3) Provide a brief characterization of a distributed system. 4) Define cloud computing and identify its core features. 5) What are the major distributed computing technologies that led to cloud computing? 6) What is virtualization? 7) What is the major revolution introduced by Web2.0? Give some examples of Web2.0 applications. 8) Discuss about Models for Inter-process communications. 9) Describe the main characteristics of a service orientation. 10) What is utility computing? 11) Describe the vision introduced by cloud computing. 12) Briefly summarize the Cloud Computing Reference Model. 13) Briefly summarize the challenges still open in cloud computing. 14) What is the difference between parallel and distributed computing? 15) List the major categories of parallel computing systems. 16) Describe the different levels of parallelism that can be obtained in a computing system. 17) What is a distributed system? What are the components that characterize it? 18) Explain PaaS in detail. 19) Explain SaaS in detail. 20) Explain in detail about KVM. 21) What are the different types of clouds? 22) Explain IaaS in detail.
Unit 2	1) What is virtualization and what are its benefits? 2) What are the characteristics of virtualized environments? 3) Discuss classification or taxonomy of virtualization at different levels. 4) Discuss the machine reference model of execution virtualization. 5) What are hardware virtualization techniques? 6) List and discuss different types of virtualization. 7) What are the benefits of virtualization in the context of cloud computing? 8) What are the advantages and disadvantages of virtualization? 9) What are the fundamental components introduced in the cloud reference model?

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	10) What does Infrastructure-as-a-Service refer to? 11) Which are the basic components of an IaaS-based solution for cloud computing? 12) What are the main characteristics of a Platform-as-a-Service solution? 13) What does the acronym SaaS mean? How does it relate to cloud computing? 14) Give the name of some popular Software-as-a-Service solutions. 15) Classify the various types of clouds. 16) Give an example of the public cloud. 17) Explain RPC in detail. 18) What kinds of needs are addressed by heterogeneous clouds? 19) Describe the fundamental features of the economic and business model behind cloud computing. 20) List some of the challenges in cloud computing. 21) Write a short note on oVirt.
Unit 3	1) Explain the benefits of using OpenStack Cloud. 2) What are the key components of OpenStack? 3) List and explain the basic OpenStack operations tasks. 4) Explain the OpenStack Command Line Interface(CLI). 5) Explain Tenant network with suitable diagram. 6) Explain Quotas in OpenStack. 7) Explain Private cloud building blocks. 8) Explain Controller deployment in OpenStack. 9) Explain Networking deployment in OpenStack. 10) Explain Block Storage deployment in OpenStack. 11) Explain Heat orchestration in OpenStack.

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Paper 3 - Cyber Forensics	
Unit 1	**Case study**: Picture the scene: Police rushing into premises on the ninth floor of a building. Almost immediately thereafter, a laptop accelerates rapidly ground ward out of the window of the aforementioned premises. As long ago as 1687, Sir Isaac Newton predicted with uncanny accuracy the inevitable conclusion to this action: Namely, the laptop (or to be strictly accurate, large number of pieces of a former laptop) coming to rest with a singular lack of grace on the floor. Luckily, no one was injured by the impact. The resultant bag of smashed laptop components arrived at Vogon's laboratory for a forensically sound data recovery. The laptop computer had impacted the floor across its front edge at an angle, forcing the hard disk drive assembly to go completely through the screen of the laptop. The highly delicate spatial relationship between heads, flexures, platters, and spindle had become disturbed, and the bed of the drive unit was not concave. This imparted an oscillation in two dimensions during drive operation. The drive electronics were destroyed in the impact. a. Give an appropriate name to the above description of the case study. b. What would you do as a computer forensics specialist in order to preserve the evidence? Justify. 1.What the steps taken to apply a systematic approach to an investigation? Elaborate. 2. Define "Image Acquisition". Write a note on whole disk encryption. 3. What are the tasks performed by computer forensics tools? Explain. 4. Explain in brief the need of computer forensics software tools. 5. Describe available computer forensics software tools. 6. Explain how to evaluate needs for computer forensics tools. 7. List digital evidence storage formats. Elaborate. 8. Explain ways to determine the best acquisition method.

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	9. Describe contingency planning for data acquisitions. 10. Explain how to use acquisition tools. 11. Describe how to validate data acquisitions. 12. Explain how to use remote network acquisition tools. 13. Describe procedures for corporate high-tech investigations. 14. Explain how to complete and critique a case. 15. Describe procedures for corporate high-tech investigations. 16. Explain requirements for data recovery workstations and software. 17. Describe how to conduct an investigation. 18. Explain the techniques used to recover erased or damaged data. 19. Write a note on data encryption and compression. 20. Write a note on automated search techniques. 21. Describe the importance of network forensics. 22. Explain standard procedures for performing a live acquisition. 23. Explain standard procedures for network forensics. 24. Define computer forensics. Elaborate the standard procedure applied in terms of it. 25. Explain in detail Incident Verification and System Identification. 26. Describe the use of network tools. 27. Explain the basic concepts of mobile device forensics. 28. Describe the procedures for acquiring data from cell phones and mobile devices.
Unit 2	1. What is a web shell? Elaborate. 2. Why is acquiring artifacts from remote endpoints a challenge in forensics investigations? 3. What types of artifacts may be generated when you visit a website? 4. Why may Network Address Translations (NATs) be a challenge during investigations? 5. Describe some common peer-to peer networks or applications. 6. Write a note on "The Examination and Analysis Phases" in Internet forensics. 7. Elaborate: Collection Phase – Local Acquisition. 8. Elaborate: Collection Phase – Network Acquisition. 9. Elaborate: Collection Phase – Remote Acquisition. 10. Write a note on the following: a. World Wide Web Threats

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	b. Hacking and illegal access 11. Discuss on Domain Name System Investigation. 12. What do you mean by obscene and incident transmission? Elaborate. 13. Explain the role of e-mail in investigations. 14. Describe client and server roles in e-mail. 15. Describe tasks in investigating e-mail crimes and violations. 16. Explain the use of e-mail server logs. 17. Describe some available e-mail computer forensics tools. 18. Write a note on types of personal information in reference to Social Media Investigations. 19. What importance does privacy controls hold in Social Media Investigations. Elaborate. 20. What are the ways of finding people on social media? 21. Write in brief about location data. 22. Briefly discuss on legal issues in Social Media Investigations. 23. Write a note on an "Overview of the Internet". Also, highlight on how it works. 24. How do web browsers work? What are the possible evidences that they can create? Explain. 25. Write a note on Web Cache. 26. Write a note on messenger forensics.
Unit 3	1. Describe how to prepare for computer investigations and explain the difference between law enforcement agency and corporate investigations. 2. Explain the importance of maintaining professional conduct. 3. Explain guidelines for processing law enforcement crime scenes. 4. List the steps in preparing for an evidence search. 5. Describe how to secure a computer incident or crime scene. 6. Explain guidelines for seizing digital evidence at the scene. 7. List procedures for storing digital evidence. 8. Explain how to obtain a digital hash. 9. Explain the importance of reports. 10. Describe guidelines for writing reports. 11. Explain how to use forensics tools to generate reports. 12. Explain guidelines for giving testimony as a technical/scientific or

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	expert witness. 13. Describe guidelines for testifying in court. 14. Explain guidelines for testifying in depositions and hearings. 15. Describe procedures for preparing forensics evidence for testimony. 16. Write a note on IT Act, 2008. 17. Elaborate on the "Preliminary" section of the IT Act, 2008. 18. Elaborate on the "Digital Signature and Electronic Signature" section of the IT Act, 2008. 19. Elaborate on the "Electronic Governance" section of the IT Act, 2008. 20. Write a note on "Electronic Signature Certificates" of the IT Act, 2008. 21. What are the penalties, compensation, and adjudication as per the IT Act, 2008? **Case Study**: Some ex-employees of BPO arm of MPhasis Ltd MsourcE, defrauded US Customers of Citi Bank to the tune of RS 1.5 crores has raised concerns of many kinds including the role of "Data Protection". The crime was obviously committed using "Unauthorized Access" to the "Electronic Account Space" of the customers. It is therefore firmly within the domain of "Cyber Crimes". a. What would you do as a cyber forensics specialist in order to prevent such unfortunate incident from happening in future? b. Justify your answer in reference to IT Act, 2008. **Case Study**: CEO of Bazee.com was arrested in December 2004 because a CD with objectionable material was being sold on the website. The CD was also being sold in the markets in Delhi. The Mumbai city police and the Delhi Police got into action. The CEO was later released on bail. This opened up the question as to what kind of distinction do we draw between Internet Service Provider and Content Provider. The burden rests on the accused that he was the Service Provider and not the Content Provider. a. What would you do as a cyber forensics specialist in order to prevent such unfortunate incident from happening in future?

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	b. Justify your answer in reference to IT Act, 2008.

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Paper 4 - **Information Retrieval**	
Unit 1	1. Discuss about Peer to Peer Search. 2. Identify the need of Information Retrieval 3. Explain the issues and challenges in information retrieval 4. define - IR, Information Extraction 5. explain various searches in IR 6. define and differentiate between precision and recall 7. Draw and explain a diagram for indexing in IR 8. Explain the process of Indexing 9. explain any two open search engine frameworks for IR. 10. Define Indexing along with an example of indexing 11.explain the Need of Term Document Incidence Matrix 12.Define - Index, Boolean retrieval model, collections, corpus 13.Draw the term document incidence matrix for given corpus and find incidence vectors. 14.Draw the inverted index for following document. Doc1-new home sales top forecast Doc2-home sales rise in july Doc3-increase in home sales in july Doc4-july new home sales rise 15.Compare Information retrieval and Data retrieval 16.Explain user interaction with IR system. 17.Explain History of IR. 18.Explain components of IR. 19.Define following terms i) Posting list ii)Boolean retrieval model iii)lexicon 20.How to process boolean queries? 21.Compare extended boolean model with ranked retrieval. 22.write note on phonetic correction. 23.explain k-gram index for spelling correction. 24.what is context sensitive spelling correction? 25.explain forms of spelling correction. 26.write note on edit distance. 27.explain following i)permuterm indexes ii)k-gram indexes for wild card queries. 28.write note on binary tree.
Unit 2	1. Describe the main idea of Link Analysis. 2. Illustrate the web as a directed graph.

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	3. Define Hub. 4. State the aim of question answering 5. Integrate the ideas of HITS Algorithm. 6. What is map reduce? Explain an example by considering a text file to explain its working 7. Categorize the modules of Hadoop Framework. 8. Analyze the Collaborative filtering and challenges 9. Discuss in detail about HITS Algorithm with necessary examples. 10. Give the concept of PAGE Ranking in detail. 11. Illustrate the abstract search engine and how will you speed snippet generation? Explain with algorithm 12. Point out stages of summarization. 13. Analyze how Handling Invisible Web is done. 14. Analyze content based recommendations of documents and products. 15. Analyze the process of cross lingual retrieval 16. Define and discuss on Personalized search 17. Explain working of collaborative filtering by analyzing any two case study 18. Give the challenges of Collaborative filtering 19. Discuss Recommender Systems 20. How to enhance personalized web search? 21. What is cross lingual retrieval? 22. Differentiate between Content based and Collaborative Filtering 23.explain anchor text and the web graph. 24.Explain Markov chain. 25.Explain hub and authorities. 26.Explain similarity in detail. 27.How to evaluate web document? 28.Explain standard test collections in evaluations. 29.Explain evaluation of unranked and ranked retrieval sets. 30.Write note on question Answering. 31.Explain the challenges in cross lingual retrieval.
Unit 3	1. Express the basis of web search with a neat diagram 2. Define pay for placement 3. What is Paid Placement? 4. What is meant by Search Engine Optimization? 5. List the need of Web Search Engine 6. List the SPAM Techniques 7. Describe in detail about XML Retrieval

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	8. Elaborate on Paid Placement 9. What is Deep web? 10. Define and explain SERP 11. Discuss invisible web 12. Define : CTR, CPC, Spam 13. Define XML? Explain the role of XML in IR 14. Why to use XML in IR? 15. State and explain the challenges in XML retrieval 16. Explain Text Centric Vs Data Centric XML 17.Define XML schema. 18.write note on vector space model for XML retrieval. 19.Write note on evaluation of XML retrieval. 20.Write note on web size measurement. 21.Explain structure of web. 22.Explain web search architecture. 23.What are the characteristics of web search engine? 24.What are the challenges issues in web search engine? 25.Write note on index process and query process. 26.Define hidden/invisible/deep web. 27.Explain the operation of search engine. 28.Define the following i) cloaking ii) stopping iii) stemming iv) parser v) inversion vi) replication 29.write note on i) text acquisition ii) text transformation iii) index creation

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Paper 5 - Digital Image Processing	
Unit 1	1. Briefly describe fundamental steps in image processing. 2. Write down advantages and disadvantages of digital image. 3. List various image file formats. Explain any one in detail. 4. Explain 2D unit impulse sequence. 5. Write a note on separable and periodic sequence. 6. Write a note on classification of 2D systems. 7. What is need of transformation? Explain classification of image transforms. 8. Explain Fourier transform. 9. What are the applications of digital image processing? 10. How image is formed in Human eye? 11. Write a short note on Sampling and Quantization. 12. Explain the different types of connectivity of pixels with suitable example. 13. What are different fields where image processing is used? 14. Write a short note on DFT 15. Write a note on Walsh transform and its application in image processing. 16. Explain image sampling and quantization. 17. What is Hadamard Transform? Write the Hadamard matrix for N=8. 18. State the properties of Discrete Cosine Transform. 19. Explain any two properties of 2D DFT. 20. Define 4-connectivity and 8-connectivity in pixel. 21. Explain the Human visual system in accordance with the processing of an image. 22. Find the auto-correlation of casual sequence x(n)={2,4,6,8} 23. Find the circular convolution of the following casual sequence in time domain x1(n)={1,2,5} and x2(n)={4,7}. 24. Find linear convolution of following casual signals. x(n)={1,2,0,1,23,1,1,2,1,0,3} h(n)={2,2,1} 25. Find the linear convolution of the following casual signal. x(n)={3,4,2,1,2,2,1,1} h(n)={1,-1}

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	26. Explain Haar transform. 27. Find the cross correlation of the following casual signal. x(n)={8,9,2,3} h(n)={4,3,6} 28. What is the function of an image sensor ? 29. Give the major classification of an image senssor. 30. List and explain elements of image processing system. 31 . give any five appplications of image processing system. 32. Distingush between a monocrome and a gray scale image. 33.what are different types of Line Impulse? Explain in details. 34. Sketch the 2D Impulse Sequence x(n1,n2)=delta(2n1, n2) 35. Sketch the 2D Impulse Sequence x(n1,n2)=delta(n1+ n2-1) 36. Write a short note on 2D Digital Filter. 37. Explain the types of 2D Digital Filter. 38. The input matrix x(m,n) and h(m,n). Perform the linear convolution between these two matrices. x(m,n)={4,5,6; 7,8,9} h(m,n)={1,1,1} 39. The input matrix x(m,n) and h(m,n). Perform the linear convolution between these two matrices. x(m,n)={1,2,3; 4,5,6; 7,8,9} h(m,n)={1,1; 1,1; 1,1} 40.write a short note on Slant Transform. 41. Write a short note on KL transform 42. Give the advantages of walsh transform over Fourier Transform.
Unit 2	1. Explain the term (a) Thresholding (b) Log Transformation (c) Negative Transformation (d) Contrast stretching (e) Grey level slicing. 2. Explain the terms: (a)Smoothing (b) Sharpening 3. Explain Dilation and Erosion and explain how opening and closing are related with them. 4. What is Structuring Element? What is the use of it in morphological operation? 5. Write a note on image enhancement using spatial filters. 6. What is histogram of an image? Compare between histogram equalization and histogram matching. 7. Write a note on weighted average filters. Give example. 8. What are high boost filters? How are they used? Explain. 9. What is dilation and erosion of and erosion of an image? State its

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applications.

10. Explain Euclidean distance, City block distance, chess board distance.
11. Explain the morphological image operations on an image.
12. Explain various image enhancement techniques in frequency domain.
13. Write a short note on Thresholding techniques.
14. Define image enhancement. Explain gray level slicing.
15. What are sharpening filters? Give examples. Explain any one in detail.
16. Explain various techniques of image arithmetic.
17. Explain bit plane slicing with suitable example.
18. Discuss various colour models used in image processing.
19. Justify "Butterworth low pass filter is preferred to ideal low pass filter."
20. Perform Histogram Equalization on Gray level distribution shown in the table. Draw the histograms of the original and equalized images.

Gray Levels	0	1	2	3	4	5	6	7
No. of Pixels	100	250	100	300	150	0	0	0

21. Explain RGB colour model to represent a digital image.
22. Compare contrast stretching and histogram equalization.
23. Can two different images have the same histogram? Justify your answer.
24. Apply the following image enhancement techniques for the given 3 bits per pixel image segment.
    (i) Digital Negative
    (ii) Thresholding T=5

$$I = \begin{bmatrix} 2 & 1 & 2 & 1 & 0 \\ 7 & 1 & 4 & 3 & 2 \\ 2 & 4 & 1 & 3 & 7 \\ 1 & 3 & 4 & 6 & 3 \\ 1 & 4 & 1 & 3 & 4 \end{bmatrix}$$

25. Perform histogram equalization and plot the histograms before and after equalization.

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Gray level	0	1	2	3	4	5	6	7
No:of pixels	128	75	280	416	635	1058	820	684

26. Given the 7 X 7 Image segment, perform dilation using the structuring element shown.

Structuring element:

1	0
0	1

0	0	0	0	0	0	0
0	1	0	1	0	1	0
0	1	0	1	0	1	0
0	1	0	1	0	1	0
0	1	1	1	1	1	0
0	0	0	1	0	0	0
0	0	0	1	0	0	0

27.can two different images have the same histogram ? Justify your answer.

28.if all the pixels in an image are shuffled, will there be any change in the histogram? Justify your answer.

29.Are convolutional filters linear? Justify your answer.

30. Two images have the same histogram. Which of the following properties must they have in common?

(i) Same total power

(ii)Same entropy

(iii) same inter pixel covariance function.

31. What will we obtain if the arithmetic mean filter is applied to an image again and again ? what will happen if we use the median filter instead?

32. List and explain five arithmetic operations along with their mathematical representation.

33.explain Homomorphic filter along with Block diagram of homomorphic filtering.

34. Explain two types of classification of Color-Quantisation Techniques.

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	35.Give the steps of Color image quantisation. 36. List the limitations of the RGB Color Model. 37. List any five color models and Explain any two in details. 38. Write a short note on HSI color model.
Unit 3	1. What do you mean by Image Segmentation? 2. Explain the classification of image segmentation techniques. 3. Explain clustering technique used for image segmentation. 4. Compare and contrast between inter pixel redundancy, coding redundancy and psycho-visual redundancy. 5. How is thresholding used in image segmentation? 6. Explain various edges detected in segmentation process. 7. Explain Huffman coding with suitable example. 8. Explain gradient operator and laplacian operator. 9. What is edge linking? Highlight its significance in image segmentation. 10. Explain the JPEG compression with suitable block diagram. 11. Define segmentation. State different methods based on similarity. Explain any one method with example. 12. Draw and explain block diagram of JPEG encoder and decoder. 13. Compare arithmetic coding and Huffman coding. 14. Explain with block diagram Transform based coding. 15. Explain the method of edge linking using Hough transform. 16. What are different types of data redundancies found in a digital image? Explain in detail. 17. Generate the Huffman code for the word ‘COMMITTEE’ 18. Write a short note on region splitting. 19. Explain run length coding with suitable example. 20. Explain edge detection. 21. Name different types of image segmentation techniques. Explain the splitting and merging technique with the help of example. 22. Compare lossy and lossless image compression. 23. Explain image compression scheme. 24. Write down steps of Shannon-Fano coding. 25. How Arithmetic coding is used in image compression? 26. Explain image compression standards. 27. What is block processing? Explain in detail. 28. Explain various JPEG modes.

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	29. What is content-based image retrieval? 30. What is an 'edge' in an image? On what mathematical operation are the two basic approaches for edge detection based on? 31. Give the following kernel (i)Sobel (ii)Prewitt (iii) Robert 32. Explain Frei-Chen Edge Detector and give the nine masks. 33. Write a short note on Laplacian of Gaussian (LOG). 34. Explain the term Difference of Gaussians Filter (DoG)

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Paper 6 - Data Science	
Unit 1	**EDA** 1. Compute mean, median and mode for (15, 10, 18, 20, 28, 32). 2. Compute mean, variance and standard deviation for (1, 3, 4,6,5). **Data Collection** 1. Distinguish between primary and secondary data. 2. Describe the various types of data collection methods. 3. Describe the types of observational methods used in data collection. 4. Explain the process of Web crawling. **Data cleaning** 1. Why is data cleaning required? 2. How to handle missing data in a dataset? 3. What is data normalization? Illustrate any one type of data normalization technique with an example. 4. Write a short note on the following smoothing techniques:- a. Smoothing by bin means b. Smoothing by bin boundaries. **Topic: Data Visualization** 1. What is heatmap? Explain its importance to visualise the existing pattern in the dataset. 2. Discuss the importance of scatter plot in data analysis. How it can be viewed in R? 3. Write short notes on the following data visualization techniques: a. Line chart b. Dendrograms 4. What is a Box plot? Describe the process to identify an outlier with Box plot. 5. Draw a Box summary plot with the following dataset: 6 6 7 8 9 9 9 10 10 11 13 **Topic: Different types of data sources** 1. Distinguish between structured and unstructured data. 2. Discuss some applications of unstructured data. == **Unit 1 -** **(Based on actual syllabus titles)**

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1. What is data? State and explain different types of data.
2. Write a note on EDA.
3. Explain any two types of data visualizations in R along with example.
4. State and explain different types of data sources.
5. State various tasks done under data management.
6. Explain Data Collection
7. What is data cleaning? Why its done? How it is done?
8. Write a note on data analysis.
9. Explain data modelling in data science.

[As R is recommended tool in Data science, some questions on R as per the topics covered in basics.ppt of thakur college workshop]

10. How to import csv file in R? What are the parameters associated with its function?
11. What is the use of *factor* and *c* in R?
12. What is a data frame in R? How to create and access it?
13. Assume that there is a file called students.csv containing columns - roll, name, X, XII, FY, SY

Write commands to do the following -

(i) Read the file in R

(ii) Give an overview of the file

(iii) Check first few records of the file

(iv) Find average X marks

(v) Display only roll, name and SY columns

14. State any 5 different ways using which you can get subset of data from a data frame in R
15. How can you know about NA values present in the column? How can you still process the columns? Give example.
16. Assume that there is a file called emp.csv containing columns - id, name, dept, desig, sal

Write commands to do the following -

(i) Display all the records of "SALES" employees

(ii) Display the records of employees having sal greater than 1 lakh but less that 5 lakh

(iii) Display only the names of the employees who are managers

(iv) Display all the employees who are clerks and who are not in IT department

(v) Sort the data based on descending order of salary

17. Explain how can you merge two data frame? State two ways.
18. How can you join data frames on columns? Give examples.
19. How can you append two data frames? Give example
20. Explain aggregate funciton.
21. What is quartile? How can you retrieve their values?
22. What is Box plot? What type of information it shows in R? Give command to draw the same.
23. What is histogram? How to draw it?
24. What is scatter plot? How to draw it?

[Questions based on topics in syllabus workshop ppt]

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	25. What is smoothing? 26. Explain resampling technique with example. 27. Explain discretization technique with example. 28. Write down the difference between qualitative and quantitative data with examples.
Unit 2	**Topic - MongoDB(Questions based on mongodbpracts.doc file shared in Thakur College Workshop)** 1. What is MongoDB? State its features. 2. What is MongoDB? State its advantages over DBMS 3. How to create, use, show and delete databases in Mongodb? Give example. 4. What is a collection in MongoDB? Give two different examples of creating collections 5. How can you see data stored in MongoDB? Explain any two methods with example. 6. Explain find function of MongoDB. 7. How can you update information in MongoDB? 8. Give examples of how to delete records in MongoDB. 9. State the use of limit and skip methods. 10. How to create indexes in MongoDB? Give example. **General questions based on syllabus titles -** 11. Write a note on data curation. 12. Explain large scale data systems. 13. Write a note on AWS 14. Describe the process of data extraction from semi-structured data on the Web. **Questions based on syllabus workshop PPT contents -** 14. What is NoSQL? What are its features? 15. What is NoSQL? State its advantages over DBMS 16. What is NoSQL? Briefly explain its types 17. Explain any one type of NoSQL technology. 18. Write a note on data transformation. 19. How can you read JSON file in R? 20. How can you read XML file in R? 21. Write a note on XPATH. 22. State few xpath expressions. 23. What is web scraping? 24. Explain various ways to do web scraping. 25. How can you read HTML in R to extract particular information? Give example. 26. Write a note on Map Reduce architecture. 27. Write a note on HBase. 28. Compare HBase & RDBMS 29. Explain procedural query language with its operations.

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	30. Explain non procedural query language with its operations. 31. Describe in detail cloud services. 32. Explain in detail homogeneous distributed database and heterogeneous distributed database.
Unit 3	**Unit 3** **(As per syllabus contents)** 1. Explain the general idea of model selection techniques in Machine learning. 2. Explain the concept of regularization. 3. What is bias? What is variance? Write a note on bias / variance trade off? 4. What are AIC, BIC? 5. Write a note on cross validation. 6. What do you mean by - LASSO regression, Ridge Regression? 7. Write a note on dimension reduction. 8. Explain feature extraction. 9. What is supervised learning? Explain any one technique. 10. Explain the general model of regression. Give the idea wrt R 11. What are regression tree? Give an idea wrt R. 12. Writ a note on logistic regression. 13. Explain SVM 14. Explain k-nn technique. 15. Write a note on PCA. 16. Explain k-means clustering. 17. Explain hierarchical clustering 18. Explain ensemble methods. 19. Write down the difference between Lasso and Ridge regression. 20. Write down the difference between classification and regression. 21. Apply k means algorithm to the following data Sample no X Y 1 185 72 2 170 56 3 168 60 4 179 68 5 182 72 6 188 77 22. Write down the difference between logistic and linear regression.

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Paper 7 - Ethical Hacking	
Unit 1	1.What is Information Security? Explain Asset, Risk, Threat, Vulnerability with respect to InfoSec. 2.Write a short note on Security, Functionality, and Ease of Use Triangle. 3.What is Access control in security? Explain identification, authentication, and authorization with respect of Access control. 4. Write a short note on CIA triad. 5. What is malware? Explain Worms and Trojan with suitable examples. 6. What is malware? Explain in brief concept of Virus. 7. What is an attack? Explain in brief rootkit attack. 8. Explain in brief about Attacks and Attack Surface. 9. What is OWASP Top 10? Explain in brief any one of the Ten Most Critical Web Application Security Risks. 11. Write a short note on CVE Database. 12. Explain the following terms: a. Keystroke Logging b. Denial of Service (DoS /DDoS) c. brute force d. phishing and fake WAP e. Eavesdropping f. Man-in-the-middle g. Session Hijacking h. Cookie Theft i. Buffer Overflow j. Identity Theft k. Waterhole attack l. Clickjacking m. URL Obfuscation n. IoT Attacks 13. What are BOTs and BOTNETs? Explain. 14. Write a short note on CSRF. 15. Explain in brief the following recent cyber attacks: a. WannaCry b. JP Morgan Chase c. Uber

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	d. eBay e. Yahoo f. Equifax
Unit 2	1. What is Ethical Hacking? Explain the types of hackers. 2. Explain Black/Gray/White Box Penetration Testing methods in detail. 3. Explain the need of Information Gathering in detail. 4. Write a short note on Crawling/Spidering with suitable example. 5. Explain the contents of a penetration testing report in detail with respect to ethical hacking. 6. Explain in detail the phases of hacking. a. Reconnaissance b. Footprinting c. Enumeration d. Scanning e. Sniffing **OR** 6. Write a short note on phases of hacking. 7. Write a short note on Vulnerability Assessment and Penetration Testing. 8. Write a short note on security testing plan. 9. What is Footprinting? What countermeasures can be taken against footprinting? 10. Define the Term Footprinting. Explain how Whois and traceroute is used in footprinting. 11. What is enumeration? What are the steps involved in performing enumeration? 12. What is Scanning? List and explain types of scanning performed. 13. State the difference between Manual and Automated Penetration Testing. 14. Why is Repeated Penetration Testing required? Explain in detail. 15. Write a short note on Authenticated Vs Unauthenticated Testing. 16. Explain the importance of Application Security Testing. 17. Explain the need of NDA. OR 17. Write a short note on NDA. 18. Explain the need of Compliance and Regulatory concerns.

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	19. Write a short note on Internal and External Penetration Testing. 20. What is WebInspect and explain how it works? 21. What is need of Metasploit vulnerability assessment tools? Explain in detail the Qualys tool. 22. Write a short note on cross site request forgery. 23. Write a short note on packet sniffing.
Unit 3	1. Compare Windows and Linux operating systems on the basis of following point: a. Customizable b. Security c. Efficiency 2. What is Smurf Attack? Explain. 3. Write a short note on MAC Flooding. 4. Write a short note on MAC Spoofing. 5. Write a short note on Event Logs alteration. 6. What is privilege escalation? What are its types? Explain. How system can be protected against privilege escalation? 7. Explain SMTP or Email based attacks in detail. 8. What are VOIP vulnerabilities? Explain any five. 9. Write a short note on reverse engineering. 10. Explain IDS/IPS in detail. 11. Explain ARP poisoning in detail. 12. What is ARP poisoning? What are the threats due to ARP poisoning? How can we defend against ARP poisoning? 13. Write a short note on System Hacking. 14. Explain Steganography in detail. 15. What is WEP Vulnerabilities? Explain. 16. Explain SYN flooding with the help of a diagram. 17. What is a password cracker? Explain various steps involved in cracking a password **OR** 17. What is password cracking? What are the password cracking countermeasures? 18. Write a note on Gaining and Maintaining Access phase. 19. Write a note on Covering your tracks phase. 20. List and explain any 5 OWASP Secure Coding Guidelines.

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	21. Describe the Honeypot and the evasion techniques. 22. Explain the Netcat Trojan in detail. 23. What is Kali Linux? Explain Metasploit in detail. 24. Write a short note on cross site scripting(XSS). 25. Explain SQL injection with suitable example. 26. Explain the following terms: a. Reverse engineering b. Steganography c. Input manipulation