Reg.No.: | | | | | | | | | | |

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5020

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Third Semester
Information Technology
P19CSOE1 – BUSINESS ANALYTICS
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Draw the POPIT model showing the views of a business system.	2	K2	CO1
2.	Write a short note on Business Analysis Service Framework	2	K1	CO1
3.	What are the four phases of the project management life cycle?	2	K1	CO2
4.	State the working of a Product Life Cycle.	2	K2	CO2
5.	What are the types of requirement documents?	2	K1	CO3
6.	Write down the advantages and disadvantages of using multiple sources to understand software requirements.	2	K2	CO3
7.	Write down the differences between Flowcharts and Data flow diagrams.	2	K2	CO4
8.	What do you understand by Additive/Subtractive Analysis?	2	K2	CO4
9.	What is Data Storytelling?	2	K1	CO5
10.	What is Data Journalism?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	What is Business Analysis? Who is a Business Analyst? Why is a Business Analyst needed in an organization? Explain in detail.	13	K2	CO1
	(OR)			
b)	Write down the techniques involved in Handling Conflicts of Stakeholder in detail.	13	K2	CO1

12.	a)	Explain the phases of the Systems Development Life Cycle in detail.	13	K1	CO2
		(OR)			
	b)	Explain Requirements Life cycle management with examples.	13	K1	CO2
13.	a)	Write down the Attributes of Good Requirements with examples	13	K1	CO3
		(OR)			
	b)	What are Requirements Gathering and why it is important? Explain the Requirements Gathering Process and techniques in detail.	13	K2	CO3
14.	a)	Explain Stakeholder Needs Analysis and draw the template of the Participation Matrix table with an example of your own.	13	K2	CO4
		(OR)			
	b)	What is a Data Flow Diagram? Explain its Various levels with an example.	13	K2	CO4
15.	a)	Describe the types of requirements and their categories in detail.	13	K2	CO5
		(OR)			
	b)	Define Requirements Elicitation and write in detail about its techniques and knowledge types.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Summarize the project life cycle phases with neat illustrations.	7	K2	CO2
		ii.	Assume that you are going to start a business (Take any one product) and place your order for an automation software for improving your business. List out the various steps involved in developing a project.	8	K4	CO2
			(OR)			
	b)		The Acme Company has developed a new battery. The engineer in charge claims that the new battery will operate continuously for at least 7 minutes longer than the old battery. To test the claim, the company selects a simple random sample of 100 new batteries and 100 old batteries. The old batteries run continuously for 190 minutes with a standard deviation of 20 minutes: the new batteries, 200 minutes with a standard deviation of 40 minutes. Test the engineer's claim that the new batteries run at least 7 minutes longer than the old. Use a 5% level of significance.	15	K6	CO5

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Question Paper Code: 6020

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Second Semester
Information Technology
P19ITE12 – AD-HOC & SENSOR NETWORKS
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the Design Goals of a MAC Protocol?	2	K2	CO1
2.	List out the self-organizing and self-configuring features in wireless ad-hoc network.	2	K1	CO1
3.	What is split – TCP?	2	K1	CO2
4.	List the classification of routing protocols based on the routing information update mechanism.	2	K1	CO2
5.	Why TDMA and FDMA media access control protocol are not suitable for wireless ad-hoc network.	2	K2	CO3
6.	List out the major properties of self-organizing network	2	K1	CO3
7.	Differentiate coarse and fine grained localization methods.	2	K1	CO4
8.	What are the types of localization? Mention its needs.	2	K1	CO4
9.	List the techniques evolved to control power in mobile Adhoc networks.	2	K2	CO5
10.	What are the necessity for mesh networks?	2	K1	CO5

PART – B

Q.No.		Questions	Marks	KL	CO
11.	a)	List the techniques evolved to control power in mobile Adhoc networks.	13	K3	CO1
		(OR)			
	b)	What are the different attacks possible over adhoc networks? Discuss.	13	K2	CO1
12.	a)	Explain the major challenges that a routing protocol designed for adhoc wireless networks face.	13	K4	CO2
		(OR)			
	b)	List the characteristics of ideal routing protocol for ad hoc wireless network. Illustrate with an example.	13	K2	CO2
13.	a)	Consider a wireless system, where we have 100 user in the system. The user only use voice service and their traffic is almost evenly distributed over time. Is TADMA or FDMA an appropriate access method for such system? Why?	13	K4	CO3
		(OR)			
	b)	What is the main difference between the contention-based or contention avoidance random access method?	13	K2	CO3
14.	a)	Explain the working of AODV defines 3 message types with a suitable example: –Route Requests (RREQs) –Route Replies (RREPs) –Route Errors (RERRs)	13	K3	CO4
		(OR)			
	b)	Describe in detail about the localization techniques in ad-hoc networks.	13	K2	CO4
15.	a)	What are the limitations of IEEE 802.11 MAC protocol that prevent from supporting QOS traffic? Explain.	13	K5	CO5
		(OR)			
	b)	Compare the performance of Heterogeneous and Vehicular mesh networks in detail.	13	K3	CO5

PART – C

Q.No.	Questions	Marks	KL	CO

16. a) Consider a MAC channel in Additive white Gaussian noise (AWGN)   K3   CO1
with the following parameters:

P1 = P2 = 100 mW; channel gains: $|h1|^2 = g1 = 0.08$ and $|h2|^$
$2 = g2 = 0.001$, System bandwidth: W = 100 kHz,   N0
$= 10^9$ W/Hz

     i.   Find the MAC capacity region   5

     ii.   Find the rate that user 1 can achieve if user 2 requires a rate of
R2 = 100 kbps   5

     iii.   Find the rate that user 1 can achieve if user 2 requires a rate of   5
R2 = 50 kbps

<div align="center">(OR)</div>

b) Suppose the DSDV routing protocol is adopted in a mobile ad hoc   K4   CO4
network. Suppose we have two nodes A and B that are neighbors.
Their routing tables are shown in the figures.

A---B

Dest	Next	Metric	Seq.
A	A	0	A-100
B	B	1	B-80
C	E	5	C-90
G	B	2	G-50
M	T	3	M-18

Dest	Next	Metric	Seq.
A	A	1	A-100
B	B	0	B-82
C	C	∞	C-91
G	G	1	G-52
M	N	5	M-20

Routing Table on A   Routing Table on B

     i.   In B's routing table, the metric to C is ∞ and the Seq. is 91.   8
What does it indicates?

     ii.   Suppose B is going to increase its OWN sequence No. to 84 and
then broadcast its routing information to its neighbors. Please   7
give out the update routing table of node A after it receive the
routing information from B.

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Question Paper Code: 6012

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Second Semester
Information Technology
P19IT206 – ADVANCED NETWORKS
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is Distribution Network and give some examples?	2	K1	CO1
2.	Define ego-centered networks.	2	K1	CO1
3.	Draw the planar network using four nodes and six edges where two of its edges crossing and without edges crossing.	2	K3	CO2
4.	What is the importance of drug–target network and disease network?	2	K2	CO2
5.	What is the time complexity of basic network operations: Insert, Delete, Find and Enumerate of the adjacency matrix representation?	2	K1	CO3
6.	Define shortest-path tree.	2	K2	CO3
7.	What are the pros and cons of random graphs over graphs?	2	K2	CO4
8.	Define the mean degree of a node. Give an example	2	K2	CO4
9.	What is the roll of crawling?	2	K1	CO5
10.	What is meant by message passing?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Explain the three-tiered structure of a traditional telephone network. Differentiate between multilayer and multiplex networks.	13	K2	CO1

b)	Explain the operation of a web crawler with suitable example. What are the representations of a portion of a metabolic network?	13	K4	CO1
12. a)	Discuss two-mode network with example. Explain the Kuratowski's theorem and its important.	13	K3	CO2

(OR)

b)	A simple network consists of n nodes in a single component. What is the maximum possible number of edges it could have? What is the minimum possible number of edges it could have? Explain briefly how you arrive at your answers.	13	K3	CO2
13. a)	Explain Two-source breadth-first search algorithm with suitable example. What (roughly) is the time complexity of finding a word in a (paper) dictionary if the size of the input is the number n of words in the dictionary?	13	K3	CO3

(OR)

b)	You are given a road map and told the average driving time along each road segment, then you are asked to find the route from A to B with the shortest average driving time. What algorithm would you use to do this, and explain the time complexity of the calculation?	13	K4	CO3
14. a)	Consider the random graph G(n,p) with n large. If the network has a giant component that fills exactly half of the network, what is the average degree of a node? For this same random graph what is the probability that a node has degree exactly 5?	13	K6	CO4

(OR)

b)	Show that in a configuration model network with nodes of degree 2 and greater, but no nodes of degree 0 or 1, there are no small components (or, more properly, the fraction of nodes belonging to such components tends to zero as $n \to \infty$). Find the advantage and disadvantage of the adjacency matrix and adjacency list representation.	13	K5	CO4
15. a)	What is the difference between a 3-component and a 3-core? Draw a small network that has one 3-core but two 3-components. Write the names of maximum flow algorithm. Which algorithm you choose and why?	13	K2	CO5

(OR)

b) Consider a configuration model in which every node has the same degree k. What is the degree distribution p_k? What are the generating functions g_0 and g_1 for the degree distribution and the excess degree distribution? Show that the giant component fills the whole network for all $k \geq 3$. What happens when k=1?   13   K3   CO5
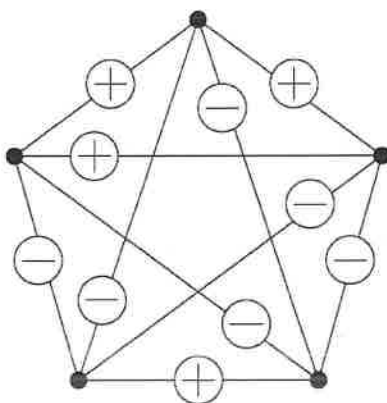
PART – C

Q.No.	Questions	Marks	KL	CO
16. a)	Discussed about Kleinberg's model with suitable example. In this network + and - indicate pairs of people who like each other or don't, respectively:		K3	CO4

i.	Is the network structurally balanced and why?	8	
ii.	Is it clusterable and if so, what are the clusters?	7	

(OR)

b) Suppose that a network has a degree distribution that follows the exponential (or geometric) form $p_k = Ca^k$, where C and a are positive constants and a < 1. Assuming the distribution is properly normalized, find C as a function of a. Calculate the fraction P of nodes that have degree k or greater. Calculate the fraction W of ends of edges that are attached to nodes of degree k or greater.   15   K3   CO5

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Question Paper Code: 6014

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Second Semester
Information Technology
P19IT207– INTERNET OF THINGS
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is the role of things and internet in IoT?	2	K1	CO1
2.	Define physical design of IoT.	2	K2	CO1
3.	Give a note on M2M communication.	2	K2	CO2
4.	What is the use of ETSI architecture?	2	K1	CO2
5.	Draw the architecture of a sensor.	2	K2	CO3
6.	List out the characteristics of WSN.	2	K1	CO3
7.	Write the building blocks of Raspberry Pi.	2	K1	CO4
8.	Tell the need of an interface in IoT.	2	K2	CO4
9.	List out 5 real time applications of IoT.	2	K1	CO5
10.	List out real world design constraints of IoT.	2	K1	CO5

PART – B

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the roles of IoT in Home automation and Agriculture.	13	K2	CO1
		(OR)			
	b)	Draw and explain the generic block diagram of an IOT device.	13	K2	CO1
12.	a)	Elaborate on the differences between IoT and Machine to Machine architecture.	13	K6	CO2
		(OR)			
	b)	Explain about M2M high-level ETSI architecture.	13	K2	CO2
13.	a)	Explain the concept of SCADA middleware.	13	K2	CO3
		(OR)			
	b)	Explain about the RFID protocol in detail.	13	K3	CO3
14.	a)	Explain the following with respect to Arduino Programming		K2	CO4
		i. Structure	4		
		ii. Function	4		
		iii. Variables, Data types	5		
		(OR)			
	b)	Explain about Serial Peripheral Interface with proper diagram.	13	K2	CO4
15.	a)	Explain smart city security architecture.	13	K3	CO5
		(OR)			
	b)	Explain key verticals targeted in smart cities with a neat diagram.	13	K2	CO5

PART – C

Q.No.		Questions	Marks	KL	CO
16.	a)	What are the 5 levels of IoT and explain each level in detail.	15	K4	CO2
		(OR)			
	b)	Explain the need MQTT protocol with an example.	15	K6	CO3

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	List out some issues in distributed operating system.	2	K1	CO1
2.	State the necessary and sufficient conditions for a deadlock.	2	K1	CO1
3.	Define communication primitives.	2	K1	CO2
4.	What is causal ordering of message?	2	K1	CO2
5.	List the advantages of distributed shared memory.	2	K1	CO3
6.	What are the types of distributed scheduling algorithms?	2	K1	CO3
7.	Differentiate synchronous and asynchronous check pointing and recovery.	2	K2	CO4
8.	What is the classification of failures in distributed operating system?	2	K1	CO4
9.	What actions are taken by the kernel to context switch between kernel level threads?	2	K2	CO5
10.	Give the examples for the problem of concurrency control.	2	K2	CO5

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO

11. a) Consider the following snapshot of a system.

Processes	Allocation A B C D	Max A B C D	Available A B C D
P0	2 0 0 1	4 2 1 2	3 3 2 1
P1	3 1 2 1	5 2 5 2	
P2	2 1 0 3	2 3 1 6	
P3	1 3 1 2	1 4 2 4	
P4	1 4 3 2	3 6 6 5	

Answer the following questions using Banker's algorithm.

    i. Illustrate that the system is in safe state by demonstrating an order in which the processes may complete?   5   K3   CO1

    ii. If a request from a process P1 arrives for (1, 1, 0, 0). Can the request be granted immediately?   4   K3   CO1

    iii. If the request from P4 arrives for (0, 0, 2, 0). Can the request be granted immediately?   4   K3   CO1

(OR)

  b)   i. Write the algorithm using test and set () instruction that satisfy all the critical section requirements   5   K3   CO1

    ii. Explain the concurrent and co-operating processes using the producer- consumer problems.   8   K3   CO1

12. a)   i. Explain the protocols that make use of vector locks for the causal ordering of messages in distributed systems.   7   K2   CO3

    ii. Explain in detail about Suzuki-Kasami's broadcast algorithm.   6   K2   CO3

(OR)

  b)   i. Discuss the principle and the purpose of lamppost's logical clock.   5   K2   CO3

    ii. State the principle of mutual exclusion. Explain the distributed mutual-exclusion algorithms.   8   K2   CO3

13. a) Explain in detail about the architecture and design issues of distributed file systems.   13   K2   CO2

(OR)

  b) Explain the architecture of distributed shared memory. List its design issues   13   K2   CO2

			Marks	KL	CO
14.	a)	Organize the algorithms used in synchronous and asynchronous check pointing and recovery during failures. Compare the algorithms and state their significance in the recovery process.	13	K4	CO4
		(OR)			
	b)	Analyze the fault-tolerance in distributed operating systems.	13	K4	CO4
15.	a)	Outline the issues involved in scheduling processes in a multiprocessor operating systems.	13	K3	CO5
		(OR)			
	b)	Discuss the two-phase locking and timestamp – based locking protocols	13	K6	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Explain the Ho-Ramamoorthy algorithm and an edge chasing algorithm. Discuss in detail about the application of these algorithms in centralized and distributed deadlock detection. Also, state their limitations and benefits.	15	K2	CO3
		(OR)			
	b)	Assess the performance of dynamic voting protocol in distributed operating systems with suitable real time examples.	15	K5	CO4

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Question Paper Code: 6018

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Second Semester
Information Technology
P19ITE06 – DEEP LEARNING
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

| Q.No.	Questions	Marks	KL	CO
1.	Is cross-validation expected to reduce the variance in the estimate of error rate of a classifier? Justify your answer.	2	K2	CO1
2.	What is maximum likelihood estimation? Where do we use it?	2	K1	CO1
3.	Which machine learning technique usually suffer with overflow? What is the reason?	2	K2	CO2
4.	Identify the type of problems should be solved using Bayesian theorem.	2	K2	CO2
5.	What is the role of partial differentiation in back propagation?	2	K1	CO3
6.	What are the limitations of gradient descent if we use it for weight updation?	2	K1	CO3
7.	What is optimization in neural network? Why do we need this?	2	K1	CO4
8.	What are the benefits of convolutional neural network over standard neural network?	2	K2	CO4
9.	What are the properties of deep generative models?	2	K1	CO5
10.	Which deep learning model may be the best for text reading which is running over the time? Justify your answer.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO

11. a) Suppose we have a random sample $x_1, x_2, ..., x_n$ where: 13   K2   CO1
- $x_i = 0$ if a randomly selected person does not have laptop, and
- $x_i = 1$ if a randomly selected person has laptop.

Assuming that the x_i are independent Bernoulli random variables with unknown parameter p, find the maximum likelihood estimator of p, the proportion of persons who have laptop.

(OR)

b) Consider the following dependencies among three variables. Prove   13   K2   CO1 mathematically which independent/conditional relationships are encoded by linear connection of these three variables.
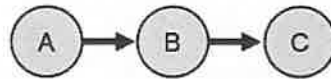
12. a) Explain in details the problem of underfitting and overfitting. Discuss   13   K2   CO2 the causes of these problems and how your model gets affected with these problems with an example.

(OR)

b) What is the difference between Bayes rule and conditional   13   K3   CO2 probability? Consider the following training dataset

Person	Height	Weight	Foot size
Male	6.0	80	11
Male	5.9	70	10
Male	5.8	75	10
Male	5.7	65	9
Female	5.0	50	6
Female	5.1	55	7
Female	5.2	52	6
Female	5.3	60	8

Apply the Naïve Bayes classifier to this problem to predict the gender of an unknown person based on this information.

13. a) Consider the following a small Insurance Dataset   13   K3   CO3

|	Input	Output
Age	Affordability	Insured (Yes=1/No=0)
20	0	0
30	1	0
40	0	1
50	1	1

Assume there is only one neuron. Show only one iteration of learning of that neuron using gradient descent. Take MSE (mean square error) for error and sigmoid as activation function. Take all other required assumptions as per your choice.

2

b) Organize the database augmentation with a simple case study   13   K3   CO3

14. a) Consider the scenario of digit recognition problem in an image.   13   K6   CO4
   Suggest and draw the best neural network as per your understanding
   for digit recognition. Give proper justification in detail.

b) What are the different neural network optimization techniques?   13   K4   CO4
   Discuss any one of them in details by taking an example.

15. a) Consider the following image for reference and tell what is the   13   K3   CO5
   difference among object localization, object classification and object
   detection? How the task of object detection can be performed using
   convolutional neural network technique?
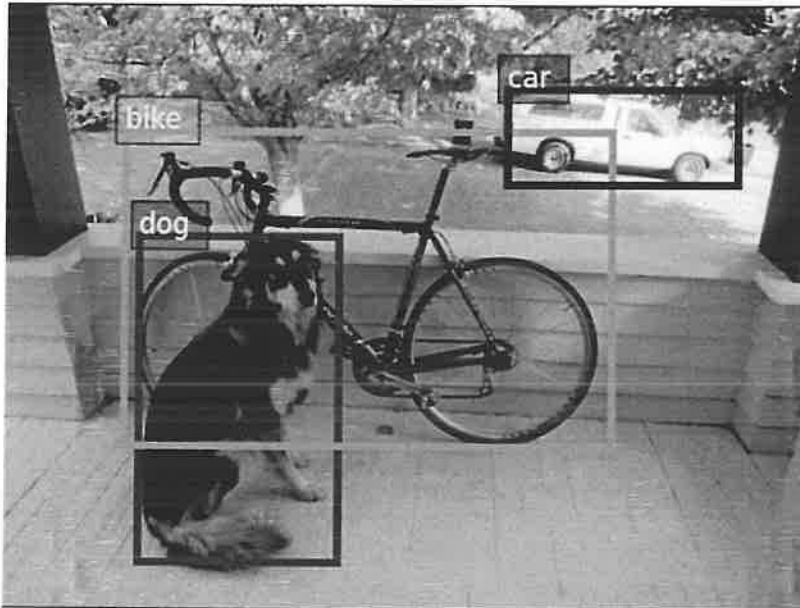
b) Design the best deep learning model in your opinion for speech   13   K5   CO5
   recognition. Discuss all the involved parameters with the rule of
   updation to support your claim.

PART – C

Q.No.	Questions	Marks	KL	CO
16. a)	Suppose you have 1000 fruits which could be either 'banana', 'orange' or 'other'. So there are the 3 possible classes of the Y variable.	15	K3	CO2

We have data for the following X variables (independent variables).
Input to these variables is binary (1 or 0).

- Long
- Sweet
- Yellow

The first few rows of the training dataset look like this:

Long (X1)	Sweet (X2)	Yellow (X3)	Fruit (Y)
0	1	0	Orange
1	0	1	Banana
1	1	1	Banana
1	1	0	Other
...	...	...	...

For the sake of computing the probabilities, let's aggregate the training data to form a counts table like this.

Type	Long	Not Long	Sweet	Not Sweet	Yellow	Not Yellow	Total
Banana	400	100	350	150	450	50	500
Orange	0	300	150	150	300	0	300
Other	100	100	150	50	50	150	200
Total	500	500	650	350	800	200	1000

So the objective of the classifier is to predict if a given fruit is a 'Banana' or 'Orange' or 'Other' when only the 3 features (long, sweet and yellow) are known.

Suppose you are given a fruit that is: Long, Sweet and Yellow, can you classify what fruit it is? Explain the entire process step wise clearly. Hint: Naïve Bayes Classification.

(OR)

b) Design the best possible neural network for digit recognition problem. Suppose the dataset consists 10,000 images (some of them are shown below), each image size is 100x100. Split it into training, testing and validation sets. Justify the taken number of hidden layers, activation functions, threshold and all other parameters. 15   K6   CO3

label = 5	label = 0	label = 4	label = 1	label = 9
label = 2	label = 1	label = 3	label = 1	label = 4
label = 3	label = 5	label = 3	label = 6	label = 1