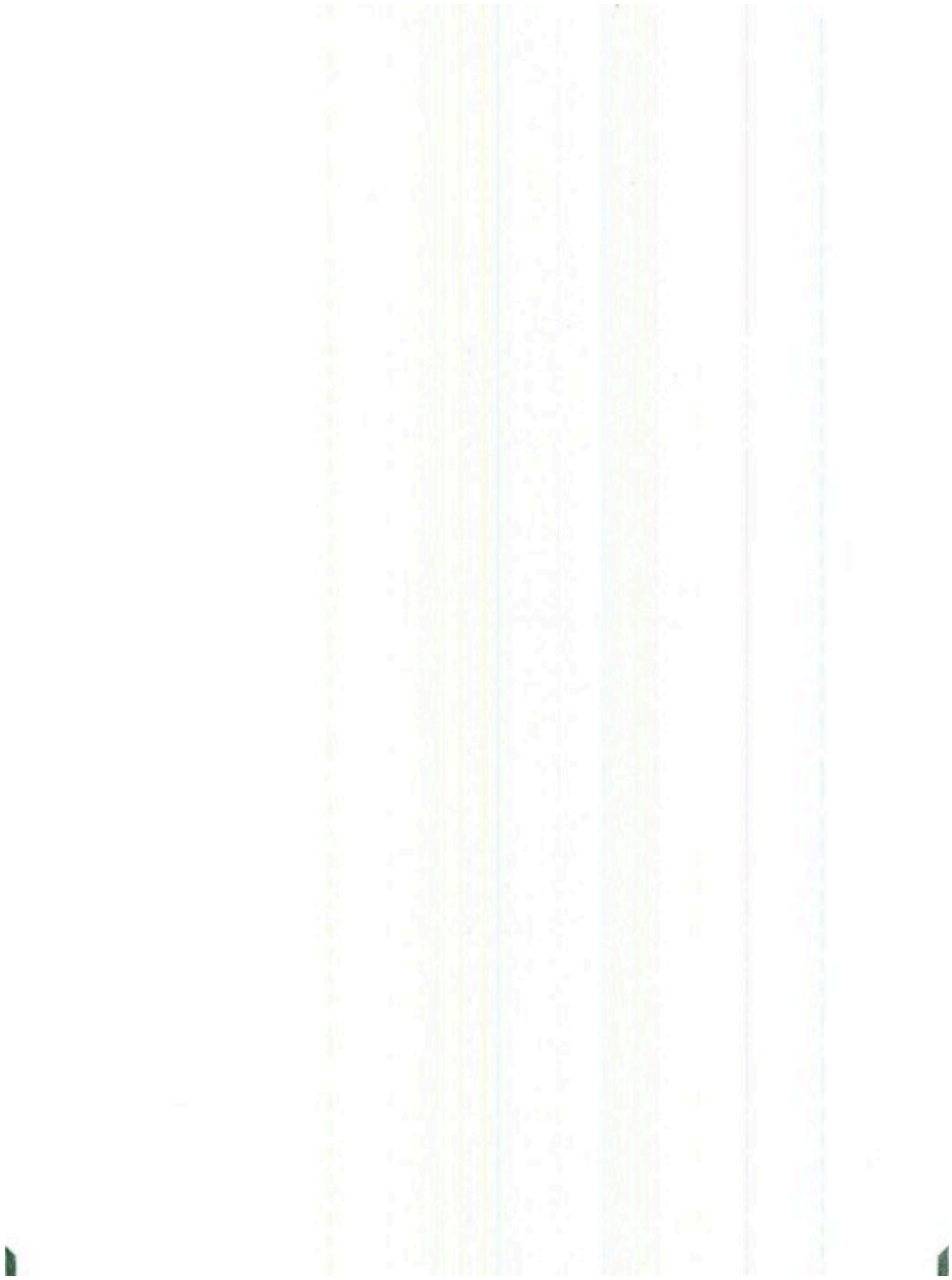






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Q. No. 2 Part (i) **Machine Learning**:- Machine Learning is a process in which models are trained on data to predict specific conditions and devise a result without a need of explicit programming.

Advantages of Machine Learning

- Machine learning Models can predicts on unseen secenarios as well
- Machine learning does'nt require explicit need of programming
- Machine Learning Models can enhance productivity, efficiency, correctness and clarity of the results.

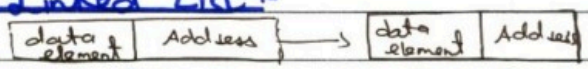
Q. No. 2 Part (ii)

Stack	Queue
Stack works on LIFO principle (Last in first out)	Queue works on FIFO principle (First in first out.)
In stack addition and deletion takes place from top.	In Queue for addition Enqueue is used and for deletion dequeue is used.
Top returns the top value without removing it.	It consist of two pointer top and rear. Rear increment and decrement when elements are added and removed while top remains stationary
Instance:- Undo command in Computes.	**Instance**:- Printing task, on Printers ---- page after page.
Stack of plates... Last will be removed first.	

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Q. No. 2 Part (iii) **Linked List:-** Linked List is a linear data structure which consist of data element and address of Nodes.

Structure of Linked List:-



Types of linked list:- Singly linked list, Doubly linked list and Circular linked list.

Advantages of Linked List:-

- In doubly linked list traversal in both directions is possible
- Linked list is dynamic in size no need to define it's size in start
- Insertion and deletion in linked list is easy.

Q. No. 2 Part (iv) **P-values:-** How likely a Null Hypothesis is correct.

P-value can check whether the result is due to random chance or it is statically significant.

It is compared critical value. If P-value is smaller and equal to critical value then results are more likely to be significant. Reject Null Hypothesis. If it is greater than critical value then result is due to random chance. Accept Null Hypothesis (H_0).

Result:- P-value can determine whether a result is significant or due to random chance.

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Q. No. 2 Part (v)

Symmetric	Asymmetric
• Symmetric cryptography consist of one key for both Encryption and decryption	• Asymmetric cryptography consist of two keys for Encryption and decryption. Public and Private key.
• Symmetric cryptography is preffered when data is shared b/w trusted parties	• Asymmetric cryptography is preffered when data is shared b/w non trusted parties
• Symmetric Algorithm is simple as compare to Asymmetric.	• Asymmetric Encryption is more complex than Symmetric because of involvement of complex Algorithms

Q. No. 2 Part (vi) **Data Normilization:-** The process of removing redundant and repeating values from structured data is known as data Normilization

Two Forms of Normilization:-

1st Normal Form: 1NF remove repeating values and make data atomic.

3rd Normal Form:- 3NF removes "Transitive dependency".

When two non primary keys are dependent on each other, this is known as transitive dependency.

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Q. No. 2 Part (vii) **Explanation:-** In Model training, Models are trained on large set of data. Majority of it's part is used for training and some of it is used for testing

Test-Train split:- The division of data used to train and test the model is known as Test Train split.

Instance:- Imagine we are training Model to identify whether provided image is of cat, dog or horse. For this purpose large data set is provided for training and some of it is used for testing. The division is based on complexity or simplicity of model. In this model we divide the data in 70-30 ratio.

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Q. No. 2 Part (viii) **Enqueue:-** The process of adding element in the Queue from back, tail or Rear.

Dequeue:- The process of removing element in the Queue from top, front in the Queue.

Front:- It returns the top value of Queue without removing it.

Summary:-
- For addition Enqueue
- For deletion dequeue
- Front returns top value / Front value without removing it.

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Q. No. 2 Part (ix) **Opening of file** :- It consists of ways.

file = open ("file name", "mode")

→ Opening of file with "open" function it requires file to be explicitly closed.

with open ("file name", "mode") as file

→ With open doesn't require explicit closing of a file.

Closing of file

→ For the closing of file

file . close( ) is used.

It is writen as file is explicitly closed when it is open with, "open" function.

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Q. No. 2 Part (x) **A/B Testing**:- A/B testing means splitting a two different versions of the same thing / Interface.

How it improves Website's usability:

Website usability is improved by A/B testing in following ways.

* Two seperate interfaces are introduced, of the website in which it is checked which is more (scal) effective in terms of usability.

Instance:- Youtube shows two versions of Interfaces. It is checked that on which Interface the traffic is high and the overall expesience of user in terms of usbility is better.

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Q. No. 2 Part (xi) **Cryptography**:- Cryptography is a science in which through Encryption data is converted into non-readable form. (cipher-text).

Cipher Method

Ceaser Cipher:- It is the oldest cipher method based on monoalphabatic. In Ceaser Cipher the position of the character are shifted forward according to given key

Instance:-

Text: HELLO

Key: 3

Ciphertext:- KHOOR (Each characters is shifter 3 characters/units)

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Q. No. 2 Part (xii) **Complex research topics**:- Complex research topics are those whose knowledge is very specific and limited to certain class of people.

How digital tools be used to engage audiences?

Digital tools like google docs for reports, Excel for presenting the data in charts, graphs and tabels. Google slides for appealing presentation Microsoft teams for collaborative work and Canvas for Infographics engage audience by simplifying the complex topics into easy and understanable thing.

Instance:- FBR presenting it's annual report of tax collection, revenue generation by charts, graphs using Excel and making it appealing presentation through Google Slides

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Q. No. 2 Part (xiii) **Block-chain:-** Block chain is a technology in which data is stored in Blocks. These growing records known as blocks are chained with cryptography. Cryptography ensures that data is immutable.

Application of Blockchain:-

Block chain in voting: Paper ballout voting system creates a lot of questions like mass rigging and manipulation of results. By introducing block chain technology in voting system: The data cannot be altered or changed Through this rigging would bee impossible and voting process will be clean, efficient and secure.

Q. No. 2 Part (xiv) **IoT in controlling air pollution.**

→ Through the installment of IoT based devices in the highly effected areas. We can collect real time data of those areas.

→ The data which is collected can bee used to study the enviournment and suggest possible solutions

→ IoT based sensors and devices can effectively contribute in controlling and combating the air-pollution

→ IoT based sensors can track the threshold hold of air pollutions and send alerts and notifications immediately

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Q. No. 3 (Page 1) **Human Computer Interaction:-**

HCI is the approach in which methods are find to make systems more able to interact with humans in more efficient ways. These ways are implemented to attain efficiency and fulfill the core objective of HCI.

Common problems in HCI

Following are the common problems that occurs in HCI.

* **Complex Interface:-** Complex Interface means presenting all of the options in a scattered way. This causes complexity and frustration for users.

Instance:- A banking App represents all of it's function on the main Interface. Total balance, transactions, debt ---- etc. This causes a chaos for user to actively and easily find the desired option.

Solution:- To make Interface simple, hide the secondary details in other options. Delete the unnecessary details from the Interface to enhance it's functionality.

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Q. No. 3 (Page 2) * Error prevention:- One of the major issue is that system does'nt provide early warning to prevent error. Error prevention means providing suitable methods to ensure that error will not occur.

Instance:- In Microsoft word, after writing a detail report, you accidently close the application So, a pop-up message will appear that do you actually want it close as to save it / Not save.

This early guidance prevents error to occur.

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Q. No. 3 (Page 3)

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Q. No. 4 (Page 1) **Hypothesis formulation:-** Hypothesis formulation is a process in which an educated guess is made by using experience and prior knowledge on some specific topic.

Why is it necessary? To check whether our educated guess is true or the results are based on some other aspects.

Null Hypothesis (H_0):- It states that (whether) the results are due to chance.

Alternate Hypothesis:- It states that the results are based on some cause and effect relationship.

Role of Null and Alternate Hypothesis

Drinking coffee can help in increasing cognitive level in students.

This is a hypothesis which checks that whether drinking coffee can increase cognitive level or is it just by chance.

Null Hypothesis in this case:- The increase in cognitive level is just by chance.

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Q. No. 4 (Page 2) Alternative Hypothesis in this case :-

The increase in cognitive level is because of drinking coffee.

Hence H_0 is rejected and Alternate Hypothesis is accepted.

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Q. No. 4 (Page 3)

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Q. No. 5 (Page 1) **IoT**:- Internet of things refers to integration of devices and internet to make them communicate and immersively effective.

IoT in health care Sector

→ Internet of things used with Medical equipment laid the foundation for new field Internet of Medical Things. IoT based devices collect medical condition of the patient and store it in cloud where AI algorithms can predict the output/diseases. They then suggest the Medication and further Tests to be conducted.

→ Wearable equipped sensors can remotely check and collect data of the patients i.e heart beat, blood pressure etc. This data is then sent to physicians where they can remotely suggest Medication, reduces the insufficient touss to hospital saving time and money

→ Modern Hospitals are equipped with Smart beds which can generate alerts to the nurses and doctors if the condition of the patient goes critical.

→ Smart Ambulances are also one of the

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Q. No. 5 (Page 2) most advanced innovation in which with in the ambulance the patient gets it's maximum treatment. minimizing the risk of death while moving towards hospitals.

IoT in traffic Management System.

→ IoT based sensors installed on roads give real time data of traffic on highways to the command and control office for better functioning and control of traffic

→ Reduces the risk of accidents by timely alerts and wasnings

→ RFID (Radio frequency Identification) allows granted access without the need to wate in long lines. saving time

→ Surviellance cameras can check on traffic rules violatess and take specific actions with proff.

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Q. No. 6 (Page 1) **Neural Network:-** Neural Network is a simulation of human brain, efficient for complex tasks.

Layers of Neural Network:-

Input layer:- Inputs the data in the form of text, image and audio.

Hidden layer:- Hidden layer process the information of Input layer and predicts the output for a given Problem.

Output layer:- It can be one or more based on complexity. Presents the output of the Problem.

Activation function:- Activation functions checks whether the specific output should be transfessed to next layers for processing or it should be ignored. The layer which crosses the threshold passed to the next layer.

Loss function:- Loss functions compares predicted output with actual output and readjust weights and biases to reach a more accurate predicted value.

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Q. No. 6 (Page 2)

How Neural Network is trained?

Neural Networks are trained by two Methods.

Feed forward propagation:- In feed forward propagation the data is transfessed as

Input layer – Hidden layer – Output layer.

It uses Activation function which checks whether this output lee transferred for more processing or it should be igraved Activation function (~~xxx~~) checks for threshold value that whether this neuron (input) is output should be transfessed or not

Back Propagation:- In back propagation the data is transfessed as

output layer → Hidden layer → Input layer.

It uses loss function to check the whether the predicted output is in accordance with actual output or not. It readjusted weights, biases to have as appropsiate value as possible.

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Q. No. 6 (Page 3)