

## Noida Institute of Engineering and Technology, Greater Noida

#### **INTRODUCTION TO POWER BI**

Unit: 5

Business Intelligence and Data Visualization (ACSAI0519)

Course Details ( B Tech 5<sup>th</sup> Sem)





SONAM
Assistant professor
CSE-DS



#### **Evaluation Scheme**

- B. Tech (IOT)
- 5th Semester
- Professional Course

#### **BUSINESS INTELLIGENCE AND DATA VISUALIZATION**

LTP	Credits
3 – 0– 0	3



#### **Evaluation Scheme**

## NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

# Bachelor of Technology Computer Science And Engineering (Internet Of Things) <u>EVALUATION SCHEME</u> SEMESTER-V

SI.	Subject	Subject Name		Periods			Evaluation Scheme				End Semester		Credit
No.	Codes	-	L	T	P	CT	TA	TOTAL	PS	TE	PE		
		WEEKS COM	ULS	SOR	Y IN	DUCT	IONI	PROGRA	M				
1	ACSIOT050	l Arm Architecture for IoT	3	1	0	30	20	50		100		150	4
2	ACSE0502	Computer Networks	3	1.	0	30	2.0	50		100		150	4
3	ACSE0503	Design Thinking-II	2	1.	0	30	2.0	50		100		150	3
4	ACSE0505	Web Technology	3	0	0	30	2.0	50		100		150	3
5		Departmental Elective-I	3	0	0	30	20	50		100		150	3
6		Departmental Elective-II	3	0	0	30	2.0	50		100		150	3
7	ACSIOT055	1 Arm Architecture for IoT Lab	0	0	2				25		25	50	1
8	ACSE0552	Computer Networks Lab	0	0	2				2.5		2.5	50	1
9	ACSE0555	Web Technology Lab	0	0	2				2:5		2.5	50	1
10	ACSE0559	Intemship Assessment	0	0	2				50			50	1
11	ANC0501 / ANC0502	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	2	0	0	30	20	50		50		100	
12		MOOCs(For B. Tech. Hons. Degree)		_									
	_	GRAND TOTAL										1100	24



## Course objective

	B. TECH. (IOT)			
Course code		L 3	P 0	Credits 3
Course title	Business intelligence and Data visualization			
Course objective:				

This course covers fundamental concepts of Business Intelligence tools, techniques, components and its future. As well as a bit more formal understanding of data visualization concepts and techniques. The underlying theme in the course is feature of Tableau, its capabilities.



## **Course Syllabus**

**UNIT-V** 

## INTRODUCTION TO POWER BI

8 HOURS

Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow, Differentiate between the various data sources, Connect Power BI to a data source, Clean and transform data to ensure data quality, Load the data to the Power BI Data Model, Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow.



#### **Course Outcomes**

Course outcomes: After completion of this course students will be able to **CO 1** Apply quantitative modelling and data analysis techniques to the solution of real-K1, K2 world business problems K2 CO 2 Understand the importance of data visualization and the design and use of many visual components K2 **CO 3** Understand as products integrate defining various analytical process flow. K3, K4 **CO4** Learn the basics of troubleshooting and creating charts using various formatting tools. K5, K6 **CO 5** Learn basics of structuring data and creating dashboard stories adding interactivity dashboard stories.



## **Previous Year Question Paper**

Printed Pa	age:- Subject Code:- ACSAI0519			(c) OLAP		(d) None	
	Roll. No:			(d) None of these		1 What is the SQL command to return the values from a table? (CO5)	1
			1	What is NumPy? (CO2)	1	(a) SELECT	
	NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA			(a) BI tool		(b) WHERE	
	(An Autonomous Institute Affiliated to AKTU, Lucknow)			(b) Map		(c) DISTINCT	
	B.Tech.			(c) Charts		(d) ORDER BY	
	SEM: V - THEORY EXAMINATION (2022 - 2023)			(d) Python Library		2. Attempt all parts:-	
Time: 3	Subject: Business Intelligence and Data Visualization  Hours  Max. Mark	100	1	Tableau File Extension is (CO3)	1	2.a. What is the difference between data, information and knowledge? (CO1)	2
	nours Max. Mark instructions:	S: 100	•	(a) twbx		2.b. Define BI Reporting (CO2)	2
	ify that you have received the question paper with the correct course, code, branch etc.			(b) twby		2.c. State some ways to improve the performance of Tableau. (CO3)	2
	uestion paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Que	estions		(c) twbw		2.d. Explain an outlier. How would you address outliers? (CO4)	
MCQ's)	& Subjective type questions.			(d) twbz			3
2. Maxim	um marks for each question are indicated on right -hand side of each question.			(4)		2.e. Define Power BI Desktop. (CO5)	27
	te your answers with neat sketches wherever necessary.		1	What is SQL? (CO3)	1	SECTION B	30
	e suitable data if necessary.			(a) language		3. Answer my five of the following:	
	bly, write the answers in sequential order.			(b) Datasource filters		3 Describe the process of knowledge creation. (CO1)	6
). No sher	et should be left blank. Any written material after a blank sheet will not be evaluated/checked.			(c) database		3 What are the major applications of Power BI? Explain each one of them in detail, CO1)	6
	SECTION A	20		(d) commands		3 Explain difference between Dashboard and Reports (CO2)	6
l. Attemp	t all parts:-		1	What are the benefits of data visualization? (CO4)	1	<ol> <li>Describe data exploration? Explain its compatibilty with drill down procedure. (CO2)</li> </ol>	6
l	KPI stands for? (CO1)	1		(a) Better analysis		3.e. Write the differences between Tableau and MS Excel with respect to designing. (CO3)	6
	(a) Key Performance Indicators			(b) Identifying patterns		3.f. Why is it important for data scientists to focus on storytelling and presentation skills? Justify	6
	(b) Key Performance Identife			(c) Exploring business insights		your answer with example. (CO4)	
	(c) Key Processes Identifer			(d) All of the above		3.g. How to sort data in Power BI and what types of sorting used in power BI. (CO5)	6
	(d) OBIEE		1	What are the functions of Data Mining? (CO4)	1	SECTION C	50
l	is a system where operations like data extraction, transformation and loading	<u> 1</u>		(a) Association and correctional analysis classification		4. Answer any one of the following:-	
	operations are executed (CO1)			(b) Prediction and characterization		4 What are the critical components of the Power Bl toolkin? Explain in detail. (CO1)	10
	(a) Data staging			(c) Cluster analysis and Evolution analysis		4 Describe data modeling explain with example. (CO1)	10
	(b) Data integration			(d) All of the above			10
	(c) ETL		1	What is the recommend method to share your reports? (CO5)	1	5. Answer any one of the following:-	
	(d) Can not say			(a) Publish them to the Power BI service		5 How to build a successful Business Intelligence strategy? Write step by step procedure of it. (CO2)	10
l	Data Visualisation is the component of (CO2)	1		(b) Create a PDF of the report, and share the PDF with others			10
	(a) Business Intelligence			(c) Copy the .PBIX file to a file folder, and give coworkers access to that folder		5 Differnce between Business Intelligence and Business Analytics with an example. (CO2)	10
	(b) RDBMS					6. Answer any one of the following:-	

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## **Previous Year Question Paper**

6	Describe Manupulating of data in Tableau in detail. (CO3)	10
6	State some ways to improve the performance of Tableau. What is the difference between published data and embedded data sources in Tableau? (CO3)	10
7. Answer	r any one of the following:-	
7	Explain the process of exporting a file in Tableau. Write the step by step Procedure. (CO4)	10
7	Describe infographics in detail Why it used for Data Storytelling justify your answer with example. (CO4)	10
8. Answer	r any one of the following:-	
8	Elaborate Forecast in Power BI. (CO5)	10
8	How would you gather dashboard requirements from stakeholders? (CO5)	10

Printed F	Page:- 04	Subject Code:- ACSAI0519			(b) Map	
	age. or	Roll. No:			(c) Charts	
					(d) Python Library	
	NOIDA INSTITUTE OF ENGINEERIN	G AND TECHNOLOGY, GREATER NOIDA		1-d.	is a system where operations like data extraction, transformation	1
		Affiliated to AKTU, Lucknow)			and loading operations are executed.(CO2)	
	В	Tech			(a) Data staging	
	SEM: V - THEORY EX	AMINATION DEC - 2023			(b) Data integration	
	Subject: Business Intellig	ence and Data Visualization			(c) ETL	
Time: 3		Max. Marks: 10	0		(d) None of the above	
	Instructions:			l-e.	Dimension in TABLEAU is (CO3)	1
		paper with the correct course, code, branch etc.				
	uestion paper comprises of three Se s (MCQ's) & Subjective type questions.	ections -A, B, & C. It consists of Multiple Choic	e		<ul> <li>(a) A measure that is computed based on the values of one or n dimensions</li> </ul>	iore
2. Maximi	um marks for each question are indica	ted on right -hand side of each question.			(b) A column in a data source that contains categorical data	
3. Illustra	te your answers with neat sketches wh	erever necessary.			(c) A data type used to represent numerical values	
	e suitable data if necessary.				(d) A type of join used to combine data from multiple tables	
	ably, write the answers in sequential or			I-f.	The type of join used in blending is (CO3)	1
	eet should be left blank. Any wri I/checked.	tten material after a blank sheet will not b	e		(a) NONE	
evaluatea					(b) Right join	
	SECTI	ION A 20	,		(c) LEFT join	
	pt all parts:-				(d) OUTER JOIN	
1-a.		oes not form part of BI Stack in SQL Server	1			
	(CO1)			I-g.	The benefits of data visualization is (CO4)	1
	(a) SSIS				(a) Better analysis	
	(b) OBIEE				(b) Identifying patterns	
	(c) SSAS				(c) Exploring business insights	
	(d) None				(d) All of the above	
1-b.	is a category of applicat	tions and technologies for presenting and	1	I-h.	A is a line that provides an approximation of the relationship between the	1
	analyzing corporate and external da	ata. (CO1)			variables. (CO4)	
	(a) EIS				(a) sparkline	
	(b) MIS				(b) gridline	
	(c) Data warehouse				(c) trendline	
	(d) Decision power				(d) None of these	
1-c.	NumPy is(CO2)		1	l-i.	A function that can only work on numeric fields is(CO5)	1
	(a) BI tool				(a) ISNUMBER	

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## **Previous Year Question Paper**

	(b) AVERAGE	
	(c) AND	
	(d) CONCATENATE	
1-j.	The expression used to indicate the table where the values would be searched from is (CO5)	1
	(a) WHERE	
	(b) FROM	
	(c) TABLE	
	(d) SELECT	
2. Attem	pt all parts:-	
2.a.	Discuss the advantages of making decision using business intelligence over making decision without business intelligence.(CO1)	2
2.b.	Define Software Development Kit(SDK). (CO2)	2
2.c.	Enlist the various data file formats in TABLEAU.(CO3)	2
2.d.	Write down the steps to publish visualization in TABLEAU online.(CO4)	2
2.e.	Elaborate about Workspace in Power BL(CO5)	2
	SECTION B	30
3. Answe	er any <u>five</u> of the following:-	
3-a.	Explain in detail the features of Data Warehouse.(CO1)	6
3-b.	Define data mining and its application in Business Intelligence.(CO1)	6
3-с.	Explain Risk Mitigation with suitable diagram.(CO2)	6
3-d.	Differentiate between dashboard and scorecard in detail.(CO2)	6
3.e.	State some ways to improve the performance of Tableau.(CO3)	6
3.f.	Discuss the various ways in which data can be manipulated in TABLEAU.(CO4)	6
3.g.	Describe how the Power BI products integrate.(CO5)	6
	SECTION C	50
4. Answe	er any <u>one</u> of the following:-	
4-a.	Discuss the architecture and the various components of BI with help of diagram.(CO1)	10
4-b.	Differentiate between BI traditional tools with Modern BI tools in detail.(CO1)	10
5. Answe	er any <u>one</u> of the following:-	
5-a.	Discuss the need of Business Intelligence Reporting Tools in various business with suitable examples.(CO2)	10

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Discuss the various trends and technologies used in Business Intelligence.(CO2)	10
r any one of the following:-	
Explain in detail the various ways to connect your data to TABLEAU.(CO3)	10
Describe the various types of charts used in TABLEAU with suitable diagrams.(CO3)	10
r any <u>one</u> of the following:-	
Discuss in detail the steps to create a story and dashboard in TABLEAU.(CO4)	10
Explain the steps of sorting and filtering data in TABLEAU.(CO4)	10
r any <u>one</u> of the following:-	
Discuss the Power BI ecosystem in detail.(CO5)	10
Define Power BI and its relationship with Excel in detail.(COS)	10
	r any one of the following:  Explain in detail the various ways to connect your data to TABLEAU.(CO3)  Describe the various types of charts used in TABLEAU with suitable diagrams.(CO3)  r any one of the following:  Discuss in detail the steps to create a story and dashboard in TABLEAU.(CO4)  Explain the steps of sorting and filtering data in TABLEAU.(CO4)  r any one of the following:  Discuss the Power BI ecosystem in detail.(CO5)



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#### Content

- Describe the Power BI ecosystem, Define Power BI and its relationship with Excel,
   Discuss the Power BI suite
- of products, Describe how the Power BI products integrate, Explain the typical analytics process flow,
- Differentiate between the various data sources, Connect Power BI to a data source,
   Clean and transform data to
- ensure data quality, Load the data to the Power BI Data Model, Describe the Power BI ecosystem, Define Power
- BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products
- integrate, Explain the typical analytics process flow



## **Course Objective**

- This course introduces data visualization theories, techniques, and tools particularly for analyzing and presenting business data. Students will design, develop, and evaluate effective visualizations and dashboards, using various development tools.
- This course focuses on how business intelligence in Tableau uses business analytics tools that make it easy to combine
  data from multiple sources, analyze and visualize information. It helps trainees in making more informed and better
  decisions to guide the business. After the completion of the course trainee will be through with all the concepts of
  business intelligence and Tableau.
- The objective of this course is to assist the folks in running a business strategically. One of the main objectives of this training is to train you on all the concepts that are related to business intelligence and Tableau. The purpose of the Business Intelligence using Tableau training program is to support better business decision-making. Topics like BI Business Intelligence, Business Intelligence with Tableau, are covered in the training program.



#### Course Outcome

## Power BI Ecosystem

- The "BI" in Power BI stands for Business Intelligence; it's software that makes reporting easier and more visually appealing. This platform is awesome for creating interactive dashboards that users can easily share.
- There are three major components of Power BI ecosystem.
- 1. Power BI Desktop
- 2. Power BI Service
- 3. Power BI Mobile



## **CO-PO and PSO Mapping**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1		2	2				1		1	1	1	
CO2	1	2	2	1	3	1		1	1	2	1	2	2	2	1
CO3	1	2	1	1	1	2				1	2	2		1	1
CO4	1	2			1	1			1	1	1	1	1	2	2
CO5	1	3	1	1	1		1	1				2		1	2
AVG	1.2	2	1.25	1	1.6	1.5	1	1	1	1.25	1.33	1.6	1.33	1.4	1.5



## Prerequisite and Recap

- Basic Knowledge Of Business Intelligence.
- Knowledge about Data mart Data warehouse.



## Power BI and its relationship with Excel

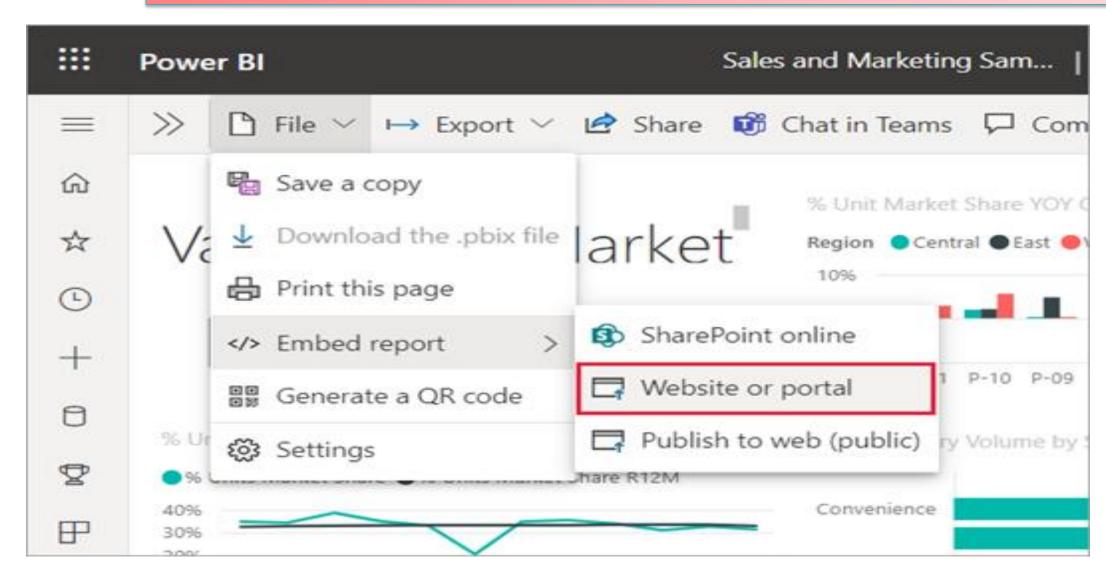
- Excel is a spreadsheet application that can do just about ANYTHING (including interactive dashboards). But that doesn't mean there aren't advantages to using Power BI, especially in conjunction with Excel. Let's take a look at some of the advantages and disadvantages of each application.
- Business intelligence (BI) is essentially the collection of tools and processes that are used to gather data and turn
  it into meaningful information that people can use to make better decisions.
- Many of the BI capabilities that are available in Excel are supported in Excel Services
- Refreshing external data
- Viewing workbooks that contain a Data Model
- Viewing, sorting, and exploring data in reports in a browser window
- Displaying a single item in a workbook in its own SharePoint Web Part



#### Power BI suits of Products

- Creating and editing customized reports for every level of expertise
- Data ingestion from hundreds of supported data sources.
- Data transformation, cleaning, data model creation with built-in Power Query Editor.
- · Al-driven analytics.
- Interactive reporting with pre-built or custom visuals.









#### Secure embed code

Here's a link you can use to embed this content.

XVzLWNlbnRyYWwtYS1wcmltYXJ5LXJlZGlyZWN0LmFuYWx5c2lzLndpbmRvd3MubmV0LyJ9

HTML you can paste into a website

<iframe width="1140" height="541.25" src="https://app.powerbi.com/reportEmbed?report

Close



- Whether a user opens a report URL directly, or one embedded in a web portal, report access requires authentication. The following screen appears if a user has not signed-in to Power BI in their browser session. When they select Sign-In, a new browser window or tab could open. Have them check for popup blockers if they don't get prompted to sign in.
- In the Secure embed code dialog, select the link you can use to embed this content, or the HTML you can paste into your blog or website in an iFrame



After the user has signed in, the report opens, showing the data and allowing page navigation and filter setting. Only users who have view permission can see the report in Power BI. All row-level security (RLS) rules are also applied. Lastly, the user needs to be correctly licensed – either they need a Power BI Pro or Premium Per User (PPU) license, or the report must be in a workspace that is in a Power BI Premium capacity. The user needs to sign in each time they open a new browser window. However, once signed in, other reports load automatically.





• When using an iFrame, you may need to edit the height and width to have it fit in your portal's web page

```
<iframe width="1080" height="760"
src="https://app.powerbi.com/reportEmbed?reportId=3b998909
-65d9-4624-98ce-41da56af1404&autoAuth=true"
frameborder="0" allowFullScreen="true"></iframe>
```



## Typical analytics process flow

- Real-time analysis is an emerging business tool that is changing the traditional ways enterprises do business. More and more organisations are today exploiting business analytics to enable proactive decision making; in other words, they are switching from reacting to situations to anticipating them.
- Essentially, business analytics is a 7-step process-
- Step 1. Defining the business needs
- Step 2. Explore the data
- Step 3. Analyse the data
- Step 4. Predict what is likely to happen
- Step 5. Optimise (find the best solution)
- Step 6. Make a decision and measure the outcome
- Step 7. Update the system with the results of the decision

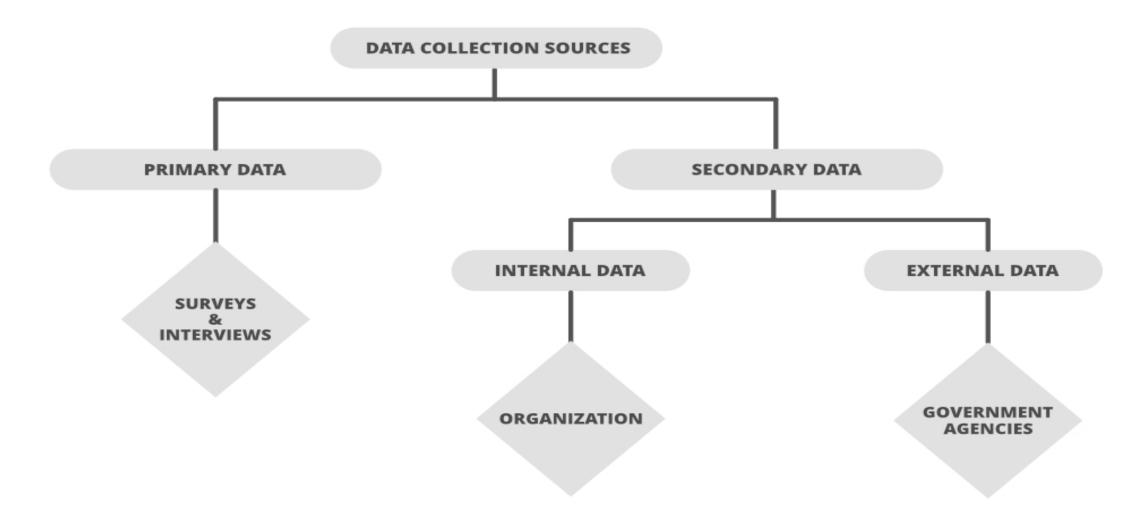


#### Differentiate between the various data sources

- Data collection is the process of acquiring, collecting, extracting, and storing the voluminous amount of data which may be in the structured or unstructured form like text, video, audio, XML files, records, or other image files used in later stages of data analysis.
- The actual data is then further divided mainly into two types known as:
- Primary data
- The data which is Raw, original, and extracted directly from the official sources is known as primary data.
- Secondary data
- Secondary data is the data which has already been collected and reused again for some valid purpose.

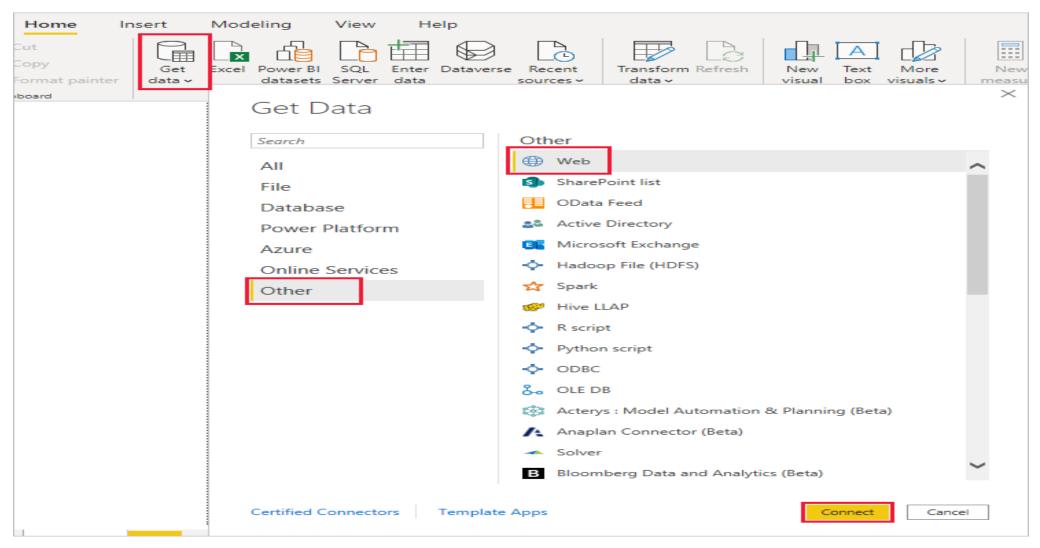


#### Differentiate between the various data sources continue





#### Connect Power BI to a data source





## Clean and transform data to ensure data quality

- Data cleaning is the process that removes data that does not belong in your dataset. Data transformation is the process of converting data from one format or structure into another.
- Here is a 6 step data cleaning process to make sure your data is ready to go.
- Step 1: Remove irrelevant data.
- Step 2: Deduplicate your data.
- Step 3: Fix structural errors.
- Step 4: Deal with missing data.
- Step 5: Filter out data outliers.
- Step 6: Validate your data.



## Clean and transform data to ensure data quality

- Data transformation is the mapping and conversion of data from one format to another. For example, XML data can be transformed from XML data valid to one XML Schema to another XML document valid to a different XML Schema. Other examples include the data transformation from non-XML data to XML data.
- Data Transformation Features
- Data transformation
- Integration with business processes.
- XQuery Mapper
- Format Builder



#### Load the data to the Power BI Data Model

- Data transformation is the mapping and conversion of data from one format to another. For example, XML data can be transformed from XML data valid to one XML Schema to another XML document valid to a different XML Schema. Other examples include the data transformation from non-XML data to XML data.
- 1. To import an Excel workbook into Power BI Desktop, select File > Import > Power Query, Power Pivot.
- 2. From the Open window, select an Excel workbook to import.
- 3. From the import dialog box that appears, select Start.
- 4. Select Close.



#### **WEEKLY ASSIGNMENT**

- Q.1 Explain Power BI
- Q.2 Discuss the difference between power bi and tableau
- Q.3 Explain all types of graph or charts in power bi
- Q.4 Consider a data set of your choice and visualise with the help of power bi
- Q.5 Discuss power bi suits of products





- 1. Which of the following does not visualize data?
- a. Charts
- b. Maps
- c. Shapes
- d. Graphs
- 2. Which of the following type of chart is not supported by pyplot?
- a. Histogram
- b. Boxplot
- c. Pie
- d. All are correct
- 3. To display histogram with well-defined edge we can write
- a. df.plot( type = 'hist', edge = 'red')
- b. df.plot( type = 'hist', edgecolor = 'red')
- c. df.plot( type = 'hist', line = 'red')
- d. df.plot(type = 'hist', linecolor = 'red')

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- 4. Plot which is used to given statistical summary is
- a. Bar
- b. Line
- c. Histogram
- d. Box plot
- 5. What is true about Data Visualization?
- A. Data Visualization is used to communicate information clearly and efficiently to users by the usage of information graphics such as tables and charts.
- B. Data Visualization helps users in analyzing a large amount of data in a simpler way.
- C. Data Visualization makes complex data more accessible, understandable, and usable.
- D. All of the above



#### References

## **Thank You**