



**B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2022**

(Regulation 2018)

Seventh Semester

**COMPUTER SCIENCE AND ENGINEERING**

U18CSE0002: Data Visualization

**COURSE OUTCOMES**

**CO1: Outline the theoretical foundations of information visualization and use it for better understanding of data.**

**CO2: Interpret the information available with network visualization, web based visual displays and maps using appropriate tools.**

**CO3: Examine methods to acquire knowledge to visualize Big data content.**

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

1. Define data visualization. Illustrate how data visualization is better than the traditional text-based data methods. CO1 [K<sub>1</sub>]
2. The field of Information Visualization suffers from not being based on a clear underlying theory. List down any three different approaches to theoretical foundations of Information Visualization. CO1 [K<sub>1</sub>]
3. Differentiate Exploratory Data Visualization and Explanatory Data Visualization. CO1 [K<sub>2</sub>]
4. `d3.selectAll("p")`  
`.data([4, 8, 15, 16, 23, 42])`  
`.style("font-size", function(d) { return d + "px"; });`  
Elaborate briefly on these statements in d3 frameworks. CO2 [K<sub>4</sub>]
5. Construct a many eyes bubble chart to illustrate the need of various subjects you have studied that helps you to attend placement interviews. CO2 [K<sub>3</sub>]
6. State the usage of different colors in mapping visualization? CO2 [K<sub>4</sub>]



7. Below is a data table that shows the population of the world in that year. Make a LINE graph using the following information. CO3 [K<sub>4</sub>]

Year	Billions of People
1804	1
1927	2
1960	3
1974	4
1987	5
1999	6
2013	7
2028	8
2054	9

What is the independent Variable? What is the dependent Variable? How many years did it take the world to go from 8 to 9 billion people? What inference can you make as to when the population will reach 10 billion people?

8. Illustrate on using network graph of how the ball gets passed from player to player in order to reach the goal in a football game. CO2 [K<sub>3</sub>]
9. Infer the limitations of using choropleth maps. CO2 [K<sub>2</sub>]
10. In order to show the distribution of massive data and to understand the outliers in the data describe the type of big data visualization that can be used. What kind of statistics it might display? Depict diagrammatically CO3 [K<sub>2</sub>]

**Answer any FIVE Questions: -  
PART B (5 x 16 = 80 Marks)  
(Answer not more than 400 words)**

11. a) Discuss on the various chart types used in data visualization with the brief description on when to use them appropriately using examples. (Stacked Bar Charts, Clustered Bar Chart, Pie Chart, Histograms) 8 CO1 [K<sub>2</sub>]
- b) Elaborate briefly on the types of Information Visualization and the design principles. 8 CO1 [K<sub>2</sub>]
12. a) Explicate the benefits of data visualization with an example case study “Employee skill improvement portal” the portal defines skill-based ranking of 16 CO1 [K<sub>3</sub>]

the employee; kindly consider four / five skills for each employee.

13. a) Imagine you own an ice cream parlor. What are the different kinds of information you require to decide on which flavors of ice cream would you be selling? You won't practically have each and every flavor that exists all around the world. Certainly, you will shortlist a countable number of flavors based on certain parameters. What would be those? How will you collect the information and utilize it to make appropriate decisions? There's much more than just this that you need to consider to run an ice cream parlor. Data handling helps to analyze the data and make better inferences and decisions. What are the different ways data can be represented? And if you open your branches in various parts of the city, what kind of network graph is required? 16 CO2 [K4]
14. a) Consider an X-ray image of the human brain that uses color coding to highlight suspected tumors, which kind of dataset type would you suggest for visual encoding? 6 CO2 [K4]
- b) When the data includes geographic information, sometimes a chart tells story better than a map. However, discuss on a case study where choropleth map is required and when does normalization of data is required? 10 CO3 [K3]
15. a) Smart watches have become one of the most popular wearables. Discuss on the possible sensor data collected from smart watches and how dynamic data displays can be done using data visualization. 16 CO3 [K3]
16. a) Differentiate the visualization of text data and Protein sequences. The multiple sequence alignment in protein sequences makes the visualization much more difficult when compared to text data. Justify this statement. 16 CO3 [K2]

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