Exam Date & Time: 12-Dec-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
END SEMESTER EXAMINATION- NOV/DEC 2023
III SEMESTER B.TECH. (INDUSTRIAL ENGINEERING) - 2022 CURRICULUM

DATA ANALYTICS AND VISUALISATION [MIE 2127]

Marks: 50 **Duration: 180 mins.**

END EXAM

Answer all the questions. Section Duration: 180 mins

1A) Analyze the impact of real-time data visualization on decision-making in mechanical engineering. Discuss a specific scenario, data types, visualization tools, and potential outcomes. (4)

1B) Explain the four steps to achieve effective quantitative data analysis with an example. (4)

1C) Define structured and unstructured data with examples from aeronautical engineering, and their use in flight performance optimization. (2)

2A) Discuss the benefits and challenges of implementing a distributed NoSQL database in aerospace engineering, considering data characteristics and project scale. (4)

2B) Perform the analysis of qualitative data from survey questionnaire.

ID	Your Post	What would improve your performance?
1	Content Developer	Workload has increased recently. I think, a pay raise is really required.
2	Content Developer	Increase in salary and good devices.
3	Team Leader	A common room to relax between works will help.
4	Team Leader	Good training facilities needed.
5	Team Leader	Pay raise will help to improve performance greatly.
6	Team Leader	A game room is necessary to increase the concentration as monotony occurs.
7	Content Developer	Need pay raise and good devices.
8	Content Developer	Need better salary and training.
9	SEO Strategist	Better office environment is required.
10	SEO Strategist	A good device will help.
11	Content Developer	Better training will certainly help.

(3)

2C) The daily returns (in %) of stock A and B are given for three days. Calculate the covariance are correlation between stock A & B and give your interpretation.

Day	Stock A(%)	Stock B(%)
1	1.2	1.7
2	0.5	0.6
3	1.0	1.3

(3)

3A) Consider a scenario where an analyst is using Excel to forecast quarterly sales figures based on historical data. The forecast formula includes a fixed growth rate, historical sales data, and seasonal adjustment factors. Analyze how the use of relative and absolute cell referencing would impact the forecast when formulas are copied across multiple cells. Include in your analysis the implications for data accuracy and formula efficiency. (5)

3B) The weights in grams of randomly selected samples is given below. Compute the confidence interval and give the inference. (3)

Weights (in grams)	1001	1003	998	992	991	994	1002	999	996	996	997	987	1004	995

3C) Explain how lookup functions and cell referencing can automate monthly sales data summarization in retail. (2)

4A) In a study of intelligence, a group of 05 students studying in the three branches of Mechanical stream (Industrial Engg, Mechanical Engg and Automobile Engg.) were selected by using random method of sample selection. An intelligence test was administered to them and scores obtained are given below. Determine, whether the 03 three groups differ in their lack of intelligence. (5)

Sl.no	Industrial Engg.	Mechanical Engg	Automobile Engg
1	15	12	12
2	14	14	15
3	11	10	14
4	12	13	10
5	10	11	10

4B) A factory has a machine that dispenses 80 mL of fluid in a bottle. An employee believes that the average amount of fluid is not 80 mL. Using 40 samples, he measures the average amount dispensed by the machine to be 78 mL with a standard deviation of 2.5.

a. State the null and alternate hypothesis (3)

b. At a 95% confidence level, is there enough evidence to support the idea that the machine is not working properly?

4C) Explain the working of a Gantt chart with a sketch. (2)

5A) Explain with an example the process of visualising the data in the context of,
a) part of whole
b) Changes over time. (5)

5B) Distinguish between the waterfall, histogram and pareto chart with an example. (3)

5C) Distinguish between Treemap and sparkline method of qualitative data presentation. (2)

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