



Foundation course in Data Analysis (Manufacturing)

Unit Code: ASC/N6461

Version: 1.0

NSQF Level: 5.5

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Description

As an Individual responsibility is to collect, prepare, and process data generated in the manufacturing process and result will contribute to informed decision-making, process optimization, and overall efficiency improvement within the manufacturing environment.

Scope

The scope covers the following :

- Collect, Clean & Pre-processing of Data from Manufacturing entities.
- Integrate & Prepare the Data based on trend analysis.
- Process the data using data exploration statistics.

Elements and Performance Criteria

Collect, Clean & Pre-processing of Data from Manufacturing entities

To be competent, the user/individual on the job must be able to:

- PC1.** Identify and gather data from various sources within manufacturing entities, including production equipment, sensors, quality control systems, and other relevant sources.
- PC2.** Collect real-time structured data for immediate insights and monitoring of ongoing manufacturing processes
- PC3.** Ensure data quality by addressing issues such as missing values, outliers, and inaccuracies
- PC4.** Apply techniques like normalization and standardization to ensure consistency and comparability across different data sources

Integrate & Prepare the Data based on trend analysis

To be competent, the user/individual on the job must be able to:

- PC5.** Merge data from diverse sources to create a unified dataset for comprehensive analysis
- PC6.** Perform necessary transformations to align data formats and units for consistency
- PC7.** Store data in a centralized data warehouse for easy accessibility and retrieval.
- PC8.** Implement robust backup and security measures to protect the integrity and confidentiality of manufacturing data.

Process the data using data exploration statistics

To be competent, the user/individual on the job must be able to:

- PC9.** Aggregate data at different levels (e.g., hourly, daily) to facilitate trend analysis and reporting
- PC10.** Use appropriate sampling methods to handle large datasets and ensure representative analysis.
- PC11.** Generate descriptive statistics to gain initial insights into the characteristics of the data
- PC12.** Convert categorical data into numerical formats using techniques like one-hot encoding
- PC13.** Perform checks to ensure data consistency and identify discrepancies
- PC14.** Document metadata, including the origin, structure, and characteristics of the collected data.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** Organization procedures for health, safety and security, individual role and responsibilities in this context.
- KU2.** Organization's emergency procedures for different emergency situations and the importance of following the same.
- KU3.** Understanding the fundamental processes involved in manufacturing, including production, quality control, supply chain, and logistics.
- KU4.** Understanding different methods of collecting data from manufacturing entities, including sensors, production equipment, and manual input.
- KU5.** Familiarity with statistical methods used in data analysis, such as descriptive statistics, inferential statistics, and regression analysis.
- KU6.** Understanding the importance of data cleaning and preprocessing in ensuring data quality.
- KU7.** Understanding how to integrate data from multiple sources and transform it into a unified dataset.
- KU8.** Ability to relate data analysis to various stages of the manufacturing lifecycle.
- KU9.** Ability to select appropriate data collection techniques based on the nature of the manufacturing process.
- KU10.** Ability to apply statistical techniques to analyze and interpret manufacturing data
- KU11.** Ability to identify and address common issues like missing values, outliers, and data inconsistencies.
- KU12.** Awareness of how data analysis can contribute to identifying areas for process optimization in manufacturing

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read safety instructions/guidelines
- GS2.** modify work practices to improve them
- GS3.** work with supervisors/team members to carry out work related tasks
- GS4.** Complete tasks efficiently and accurately within stipulated time
- GS5.** inform/report to concerned person in case of any problem
- GS6.** make timely decisions for efficient utilization of resources
- GS7.** write reports such as accident report, in at least English/regional language

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Collect, Clean & Pre-processing of Data from Manufacturing entities</i>	12	14	-	6
PC1. Identify and gather data from various sources within manufacturing entities, including production equipment, sensors, quality control systems, and other relevant sources.	2	2	-	1
PC2. Collect real-time structured data for immediate insights and monitoring of ongoing manufacturing processes	3	4	-	2
PC3. Ensure data quality by addressing issues such as missing values, outliers, and inaccuracies	3	4	-	1
PC4. Apply techniques like normalization and standardization to ensure consistency and comparability across different data sources	4	4	-	2
<i>Integrate & Prepare the Data based on trend analysis</i>	14	12	-	6
PC5. Merge data from diverse sources to create a unified dataset for comprehensive analysis	3	2	-	1
PC6. Perform necessary transformations to align data formats and units for consistency	4	3	-	2
PC7. Store data in a centralized data warehouse for easy accessibility and retrieval.	4	3	-	2
PC8. Implement robust backup and security measures to protect the integrity and confidentiality of manufacturing data.	3	4	-	1
<i>Process the data using data exploration statistics</i>	14	14	-	8
PC9. Aggregate data at different levels (e.g., hourly, daily) to facilitate trend analysis and reporting	3	3	-	1
PC10. Use appropriate sampling methods to handle large datasets and ensure representative analysis.	3	3	-	2
PC11. Generate descriptive statistics to gain initial insights into the characteristics of the data	2	2	-	2

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. Convert categorical data into numerical formats using techniques like one-hot encoding	2	2	-	1
PC13. Perform checks to ensure data consistency and identify discrepancies	2	2	-	1
PC14. Document metadata, including the origin, structure, and characteristics of the collected data.	2	2	-	1
NOS Total	40	40	-	20

National Occupational Standards (NOS) Parameters

NOS Code	ASC/N6461
NOS Name	Foundation course in Data Analysis (Manufacturing)
Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Production Engineering
NSQF Level	5.5
Credits	2
Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (In trades: Manufacturing/Mechanical/Automobile/Electrical/Electronics) OR Pursuing 3rd year of UG (In trades: Manufacturing/Mechanical/Automobile/Electrical/Electronics or relevant) and continuous education)
Version	1.0
Last Reviewed Date	NA
Next Review Date	NA
CCN Category	1