Define : focuses on selecting high-impact projects and understanding which underlying metrics will reflect project success

A) Is it a cohesive **1500 -1700** word paper opening with the business process and **problem statement?**

1.0 Define: Why Doing the Project?

Objectives	Tools
1.1 Identify what is important to customer	Customer Voice (VOC)
	CT-Tree
	Kano Analysis
	Financial Analysis (COPQ)
	Pareto Chart
	QFD
	Time Series/Run Chart
1.2 Determine Performance Standard and Scope	SIPOC
	Project Charter
	Gant Chart
	Stakeholder analysis

DMAIC Phase Steps	Tools Used
D – Define Phase: Define the project goals and customer (internal and external) deliverables.	
· Define Customers and Requirements (CTQs) · Develop Problem Statement, Goals and Benefits · Identify Champion, Process Owner and Team · Define Resources · Evaluate Key Organizational Support · Develop Project Plan and Milestones · Develop High Level Process Map	· Project Charter · Process Flowchart · SIPOC Diagram · Stakeholder Analysis · DMAIC Work Breakdown Structure · CTQ Definitions · Voice of the Customer Gathering

is about documenting the current process, validating how it is measured, and assessing baseline performance. Some of the important tools in this phase include trend charts, basic Pareto charts, process flowcharts, and process capability measurement (sigma level).

B) Was the success measure clearly identified, operationally defined and baseline identified? (Was the data identified as continuous or discrete, includes SQL?)

C) Was the data measurement plan or data stratification tree included?

D) Was the data collection method identified?

E) Was there rationale for the sample size taken? Use of the formula? Is there any reference to measurement error and how to minimize?

F) Are 4-5 tools and techniques clearly identified? Are the tools linked/ pertinent to the data analysis?

2.0 Measure: How are We Doing?	
Objectives	**Tools**
2.1 Determine what to measure (Y)	VSM (Current State)
	Swimlane Diagram
	Process Mapping
	Operational Definitions
	Data Collection Plan
	Check Sheet
	Survey
	Pareto Chart
	Histogram
	Box Plot
2.2 Validate measurement system	Measurement System Analysis (MSA)
2.3 Quantify Baseline Process Capability	Process Capability Analysis
	Baseline Analysis
2.4 Quick-Wins Opportunity	Quick-Wins

DMAIC Phase Steps	Tools Used
M – Measure Phase: Measure the process to determine current performance; quantify the problem.	
· Define Defect, Opportunity, Unit and Metrics · Detailed Process Map of Appropriate Areas · Develop Data Collection Plan · Validate the Measurement System · Collect the Data · Begin Developing Y=f(x) Relationship · Determine Process Capability and Sigma Baseline	· Process Flowchart · Data Collection Plan/Example · Benchmarking · Measurement System Analysis/Gage R&R · Voice of the Customer Gathering · Process Sigma Calculation(SQL)

F) Are 4-5 tools and techniques clearly identified? Are the tools linked/ pertinent to the data analysis?

3.0 Analyze: What is Wrong?

Objectives		Tools
Data Door	3.1 Identify causes (Xs)/Key Process Input Variable (KPIV) of variation and defects	Cause & Effect Diagram
		Cause & Effect Matrix
		FMEA
		Pareto Chart
	3.2 Provide statistical evidence that causes are real.	Hypothesis Test
		ANOVA
		Regression Analysis
		Scatter Plot
Process Door	3.3 Identify waste (MUDA), variation (MURA) and uneveness (MURI) in process	Waste Analysis
		Value Analysis
		Takt Time
		Bar Chart
		Overall Equipment Efficiency (OEE)
		Kaizen Blitz
	3.4 Improve Process Flow and achieve Just-in-Time (JIT)	Spagetti Diagram
		One piece flow
		Supermarket system
		Cell Shape

DMAIC Phase Steps	Tools Used		
A – Analyze Phase: Analyze and determine the root cause(s) of the defects.			
· Define Performance Objectives	· Histogram		5 Whys
· Identify Value/Non-Value Added Process Steps	· Pareto Chart		Time Series/Run Chart
· Identify Sources of Variation	· Scatter Plot		Regression Analysis
· Determine Root Cause(s)	· Cause and Effect/Fishbone Diagram		
· Determine Vital Few x's, Y=f(x) Relationship	· Process Map Review and Analysis		
	· Statistical Analysis		
	· Hypothesis Testing (Continuous and Discrete)		
	· Non-Normal Data Analysis		

focuses on fully understanding the top causes identified in the Analyze phase, with the intent of either controlling or eliminating those causes to achieve breakthrough performance. The overall theme for the Improve phase is process redesign, and the following Six Sigma tools are commonly used in this phase – Regression Analysis, Hypothesis Testing, Design of Experiments (DOE), Analysis of Variance (ANOVA)

G) Does the data analysis clearly tie to the problem **conclusion**? Is the "discovery" clear to the reader?

4.0 Improve: What Needs to be Done?

Objectives	Tools	
4.1 Determine solutions in Table4 operating levels and tolerance	Data Door	Design of experiment (DOE)
		2k Factorial
		Response Surface Method (RSM)
	Process Door	Brainstorming
		SCAMPER
		6-3-5 Brainwriting
		Ease-Impact Diagram
		Affinity Diagram
		Priority Matrix
4.2 Install Solution and provide statistical evidence that the solutions work	Action Plan	
	VSM (future State)	
	Swimlane Diagram (New)	
	Process flow (New)	
	Validation Plan	
	Simulation	
	Hypothesis Testing (Before and After)	
	Process Capability (New)	
	Total Preventive Maintenance (TPM)	
	SMED	
	Kanban	
	5S	
	Poka Yoke	
	Kaizen Sheet	
	Pugh Matrix	
	Cost Saving Calculation	

DMAIC Phase Steps	Tools Used	
I – Improve Phase: Improve the process by eliminating defects.		
· Perform Design of Experiments	· Brainstorming	Simulation Software
· Develop Potential Solutions	· Mistake Proofing	
· Define Operating Tolerances of Potential System	· Design of Experiments	
· Assess Failure Modes of Potential Solutions	· Pugh Matrix	
· Validate Potential Improvement by Pilot Studies	· QFD/House of Quality	
· Correct/Re-Evaluate Potential Solution	· Failure Modes and Effects Analysis (FMEA)	

is about sustaining the changes made in the Improve phase. The best controls are those that require no monitoring (irreversible product or process design changes). But oftentimes there are process settings, setup procedures, etc., requiring that employees follow specific requirements in daily operations – these items are typically documented in a control plan.

5.0 Control: How Do We Guarentee Performance?

Objectives	Tools
5.1 Establish Process Controls system	Control Plan
	Audit Plan
	SOPs
	Training Plan
	Communication Plan
	5S
	Visual Control
	Poka Yoke
5.2 Implement Statistical Process Control	Control Chart
5.3 Institutionalize the Improvement	Replication Plan
	Standardized Work
5.4 Close the Project	Project Commisioning
	Project Closure

DMAIC Phase Steps	Tools Used
C – Control Phase: Control future process performance.	
· Define and Validate Monitoring and Control System	· Process Sigma Calculation
· Develop Standards and Procedures	· Control Charts (Variable and Attribute)
· Implement Statistical Process Control	· Cost Savings Calculations
· Determine Process Capability	· Control Plan
· Develop Transfer Plan, Handoff to Process Owner	
· Verify Benefits, Cost Savings/Avoidance, Profit Growth	
· Close Project, Finalize Documentation	
· Communicate to Business, Celebrate	