Lesson Plan

Subject	: **Quality and Reliability Engineering (MEP-412A)**
Lesson plan Duration	: 15 Weeks
Work load (lecture) per week	: Lectures: 3 hours/Week

Lecture No	Description
1	Brief introduction and course outcomes of quality and reliability engineering. industrial significance of Q&R.
2	**Unit 1:** Quality value and engineering, Quality systems, quality engineering in product. design.
3	Production process, system design, parameter design.
4	Tolerance design, statistical methods for quality control.
5	Statistical methods for quality control and improvement, mean, median, mode, standard deviation, calculating area.
6	Normal distribution tables, finding the Z score, Central limit theorem.
7	**Unit 2:** Variation in process: Control charts for variables: X-bar and R charts.
8	Control charts for attributes P.
9	Control charts for attributes C.
10	Control charts for attributes np & U.
11	Establishing and interpreting control charts process capability
12	Quality rating, Short run SPC.
13	Acceptance sampling by variables and attributes.
14	Single, double, sequential and continuous sampling plans.
15	Design of various sampling plan.
16	**Unit 3:** Loss function, tolerance design: N type, L type, S type; determination of tolerance for these types.
17	Online quality control – variable characteristics.
18	Attribute characteristics, parameter design
19	Concept and definition of reliability: Reliability Parameters: Reliability as a function of time, failure rate as a function of time.

20	Bath-tub curve, constant failure rate, increasing failure rate.
21	Mean time to failure (MTTF), MTTF as a function of failure rate.
22	Mean time between failure (MTBF), mean down time (MDT).
23	Maintainability &Availability.
24	**Unit 4:** Brief discussion on hazard models:Constant hazard model
25	Nonlinear hazard model.
26	Linearly increasing hazard model.
27	Weilbull distribution, Advantages of weibull distribution.
28	System reliability models: series system, parallel system.
29	Series-parallel system.
30	Complex system:Reliability of series.
31	Parallel & standby systems.
32	Complex systems.
33	Reliability prediction.
34	System effectiveness.
35	Reliability testing.
36	Case study: Reliability Analysis in process industries.
37	Case study: Reliability Analysisin oil and gas industries with optimization techniques.
38	Case study: Reliability Analysis and Failure mode and effect analysis: a risk assessment tool.
39	Literature survey for Reliablity, Availability, Maintainability analysis in process industries.
40	Queries related to Q& R.