DEPARTMENT OF STATISTICS				*CLASS: I PG*				
Sem	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
II	NME – 2	21P2SNM2	Industrial Statistics	2	2	25	75	100

Nature of Course				
Knowledge and skill	✓		Employability oriented	✓
Skill oriented			Entrepreneurship oriented	

Course Objectives:

1. Understand the concepts underlying statistical quality control and to develop their ability to apply those concepts to the design and management of quality control processes in industries.
2. To exposure the Sampling Inspection Plans.

Unit	Description	No of Hours	K-Levels	CLO
I	Introduction – Basic of Statistical Quality Control - assignable causes, chance causes – Definition – Benefits - Process control and Product control – control limits, specification limits and tolerance limits.	7	**K2**	**1**
II	Control charts - Major parts of control charts – 3 sigma control limits – tools for Statistical Quality Control - uses of control charts – Modified Control limits	4	**K2**	**2**
III	Control charts for variables – Steps for $\overline{X}$ and R charts - Control limits for $\overline{X}$ and *R* – Construction of control chart for $\overline{X}$, *R* (range) – Criterion for detecting lack of control in $\overline{X}$ and *R*– Interpretation of $\overline{X}$ and *R* – Control charts for standard deviation (or $\sigma -$ chart)	7	**K2**	**3**
IV	Control charts for Attributes – Control charts for fraction defective (*p*- Charts) – Control charts for number of defectives (*d*- Charts) - Interpretation of *p* – chart - Control charts for number of defects per unit (*c*- chart) – control limits for *c*- chart – Application of *c*- chart	6	**K2**	**4**
V	Acceptance Sampling inspection plans – Acceptable Quality level (AQL) – Consumer's and Producer's risk – Rectifying inspection plan – Average Outgoing Quality Limit (AOQL) – OC Curve – Average Sample Number (ASN) – Sampling inspection plan for attributes - Single and Double sampling plan	6	**K2**	**5**

Books for Study :

1. Fundamental of Applied Statistics (2014), S.C.Gupta and V.K.Kapoor, Sultan Chand &Sons(P) Ltd, fourth edition

Web references:

1. Basic of Statistical Quality Control
   http://www.gdcboysang.ac.in/About/droid/uploads/contents%20of%20UNIT%20iii-20A.pdf
2. Control charts for variables and Control charts for attributes
   https://pdhonline.com/courses/p209/p209content.pdf
3. Acceptance Sampling inspection plans
   http://www.mbbcollege.in/db/notes/379.pdf
   http://egyankosh.ac.in/bitstream/123456789/20768/1/Unit-5.pdf

Rationale for Nature of the course

The course enables the students to work in almost all the sectors of the industries by applying the various statistical tools.

Activities having direct bearing on Skill development / Employability / Entrepreneurship

Problem solving on applied statistics

Pedagogy

Chalk and Talk, PPT, Seminar, Interaction, Problem solving.

Lecture Schedule

Unit	Topics	Hours	Mode
I	Introduction – Basic of Statistical Quality Control - assignable causes, chance causes.	2	PPT, Chalk and Talk and Assignments
	Definition – Benefits - Process control and Product control	2	
	Control limits, specification limits and tolerance limits.	3	
II	Control charts - Major parts of control charts – 3 sigma control limits	2	PPT, Chalk and Talk
	tools for Statistical Quality Control - uses of control charts, Modified Control limits	2	
III	Control charts for variables – Steps for $\bar{X}$ and R charts - Control limits for $\bar{X}$ and *R*	3	PPT, Chalk and Talk, Assignments and seminar
	Construction of control chart for $\bar{X}$, *R* (range) – Criterion for detecting lack of control in $\bar{X}$ and *R*	2	
	Interpretation of $\bar{X}$ and *R* – Control charts for standard deviation (or $\sigma -$ chart)	2	
IV	Control charts for Attributes – Control charts for fraction defective (*p*- Charts) - Interpretation of *p* – chart	3	PPT, Chalk andTalk, Assignments and seminar
	Control charts for number of defectives (*d*- Charts)	2	
	Control charts for number of defects per unit (*c*- chart) – Control limits for *c*- chart – Application of *c*- chart	1	
V	Acceptance Sampling inspection plans – Acceptable Quality level (AQL) – Consumer's and Producer's risk	3	PPT, Chalk and Talk, Assignments and seminar
	Rectifying inspection plan – Average Outgoing Quality Limit (AOQL) – OC Curve – Average Sample Number (ASN)	2	
	Sampling inspection plan for attributes - Single and Double sampling plan	1	

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO's	Course Learning Outcomes	Knowledge Level
CLO-1	Differentiate assignable and chance causes	Up to K2
CLO-2	Derive control limits	Up to K2
CLO-3	Demonstrate the ability to design, use, and interpret control charts for variables.	Up to K2
CLO-4	Demonstrate the ability to design, use, and interpret control charts for attributes.	Up to K2
CLO-5	Distinguish single and double sampling plan	Up to K2

MAPPING CLOs WITH PSOs

#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO-1		2	3	2	3		3
CLO-2		2	3	2	3		3
CLO-3	2	2	3	2	3		3
CLO-4	2	2	3	2	3		3
CLO-5	2	2	3	2	3		3

Advance application – 3; Intermediate level – 2; Basic level - 1

CIA-I–BluePrint

CLOs	**K- Level**	**Section A**		**Section B**		**Section C**	
		Short Answers		**(Either/or Choice)**		**(Open Choice)**	
		No. of Questions	**K- Level**	**No. of Questions**	**K- Level**	**No. of Questions**	**K- Level**
CLO 1	Up to K2	1	K1	1	K2/K2	1	K1
CLO 2	Up to K2	2	K1	1	K2/K2	2	K1
No. of Questions to be asked		3		2		3	
No. of Questions to be answered		3		2		2	
Marks for each question		2		7		10	
Total Marks for each section		**6**		**14**		**20**	

CIA-I :: Distribution of Section-wise Marks with K levels

K Levels	**Section A (No Choice)**	**Section B (No Choice)**	**Section C (Either/or)**	**Total Marks**	**% of Marks without choice**	**Consolidated %**
K1	6	-	30	**36**	56.25	**100**
K2	-	28	-	**28**	43.75	
K3	-	-	-	**-**	-	**-**
K4	-	-	-	**-**	-	**-**
Total Marks	**6**	**14**	**30**	**64**	**100.00**	**100%**

CIA-II – Blue Print

CLOs	K- Level	Section A		Section B		Section C	
		Short Answers		(Either/or Choice)		(Open Choice)	
		No. of Questions	K- Level	No. of Questions	K- Level	No. of Questions	K- Level
CLO 3	Up to K2	1	K1	1	K2/K2	1	K1
CLO 4	Up to K2	2	K1	1	K2/K2	2	K1
No. of Questions to be asked		3		2		3	
No. of Questions to be answered		3		2		2	
Marks for each question		2		7		10	
Total Marks for each section		**6**		**14**		**20**	

CIA-II :: Distribution of Section wise Marks with K levels

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Total Marks	% of Marks without choice	Consolidated %
K1	6	-	30	**36**	56.25	**100**
K2	-	28	-	**28**	43.75	
K3	-	-	-	**-**	-	**-**
K4	-	-	-	**-**	-	**-**
Total Marks	**6**	**14**	**30**	**64**	**100.00**	**100%**

CLO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination -Blue Print

Units	CLOs	K-Level	Section – A		Section – B		Section – C	
			Short Answers		(Either / or Choice)		(Open Choice)	
			No. of Questions	K-Level	No. of Questions	K-Level	No. of Questions	K-Level
1	CLO 1	Up to K2	1	K1	1	K2/K2	1	K1
2	CLO 2	Up to K2	1	K1	1	K2/K2	1	K1
3	CLO 3	Up to K2	1	K1	1	K2/K2	1	K1
4	CLO 4	Up to K2	1	K1	1	K2/K2	1	K1
5	CLO 5	Up to K2	1	K1	1	K2/K2	1	K1
No. of Questions to be asked			5		5		5	
No. of Questions to be answered			5		5		3	
Marks for each question			2		7		10	
Total Marks for each section			10		35		30	

Distribution of Marks with K Level for Summative Examination

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (No Choice)	Total Marks	% of Marks (without choice)	Consolidated
K1	10	-	50	60	46.15	100
K2	-	70	-	70	53.85	
K3	-	-	-	-	-	-
K4	-	-	-	-	-	-
Total Marks	**10**	**35**	**50**	**130**	**100.00**	**100**

Course Designers:

1. **Dr. P. Vetri Selvi**
2. **Dr.M. Venkateswaran**