GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

COURSE TITLE: STATISTICAL QUALITY CONTROL

(Code: 3342905)

Diploma Programme in which this courses offered	Semester in which offered
Textile Manufacturing Technology	4th Semester

1. RATIONALE

In industry, diploma graduates are required to judge quality of raw materials, work in process and that of final products such as yarn and fabrics continuously to maintain quality as per requirement. This is a very important activity and involves intermittent or continuous manual or automated inspection of parameters to collect data and analyse it using statistical quality control techniques to interpret quality of raw materials, work in process and final products as yarn and fabrics. Based on this need, this course has been designed to provide the necessary knowledge and skills in statistical quality control techniques.

2. COMPETENCY:

The course content should be taught and curriculum should be implemented with the aim to achieve required skills so that students are able to acquire following competencies.

- **Analyse and interpret textile data related to industry processes / sub processes/ product parameters for quality control in yarns, colouring (Dyeing) and fabrics using statistical techniques.**

3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

  i. Calculate measures of central tendencies and dispersion of given data.
 ii. Establish correlation between two given variables.
iii. Apply Poison and normal distribution.
 iv. Apply T, F and CHI Sq. test & Judge the hypothesis.
  v. Prepare X chart & R chart & interpret the charts.
 vi. Describe international system units, recommended by BIS for textile.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
3	0	0	3	70	30	00	00	100

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** -Practical; **C** – Credit;; **ESE** -End Semester Examination; **PA** - Progressive Assessment.

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Introductio n to S.Q.C. in textile	1a.Describe concept of Quality control for textile parameter variables. 1b. List the textile parameter variables requiring Q.C 1c.List the Parameters of Textile Processes & Sub processes 1d.Enumerate Importance of SQC in Textile processes & Sub processes - Count , Twist, Strength, Blend %age, Color, fibre length 1e.Prepare frequency distribution from the given data. 1f.Prepare graphical charts for given frequency distribution	1.1 Textile parameters : Parameters of Textile Processes & Sub processes - Count ,Twist,Strength, Blend %age, Color, fibre length , weaving , fabric , printing , processing , knitting , utilities etc 1.2 Importance of Statistics 1.3 Parameters of Textile Processes & Subprocesses 1.4 -Count ,Twist,Strength, Blend %age, Color, fibre length , weaving , fabric , printing , processing , knitting , utilities etc 1.5 Different types of frequency distribution 1.6 Different methods of graphical Representation
Unit– II **Basic statistical concept**	2a. Calculate measures of central tendency- mean, mode, median, and quartile. 2b. Calculate Mean deviation, standard deviation. c.v. %, Variance 2b.1 Describe the effect of change in values of Mean deviation, standard deviation. c.v. %, Variance on Parameters of Textile Processes & Subprocesses -Count ,Twist,Strength, Blend % age, Color, fibre length , weaving , printing , processing , knitting , utilities ,etc 2c. Establish correlation between two given variables. 2d. Describe sampling technique for sample collection from the processes / sub processes product	2.1 Different Measures of central tendency 2.2 Calculation of mean, median, mode and quartile. 2.3 Different Measures of Dispersion 2.4 Calculation of mean deviation, Standard deviation and C.V.% 2.5 Correlation- diff types of correlation 2.6 KarlPearson's coefficient of correlation 2.7 Parameters of Textile Processes & Sub processes -Count ,Twist, Strength, Blend %age, Colour , fibre length , weaving , printing , processing , knitting , utilities ,etc 2.8 Sampling Technique for textile processes/sub processes intermediate product : Auto , Manual for Fibre / sliver / lea/ yarn (single / two ply) / fabric , weaving (Beam / Pirn) processing, knitting , utilities etc.
Unit– III Theoretical	3a. Apply binomial distribution for working out probability	3.1 Detail study of Binomial distribution with simple Calculation.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Distribution	for event. 3b. Apply Poisson distribution 3c. Apply normal distribution	3.2 Detail study of Poisson distribution with simple Calculation. 3.3 Detail study of normal distribution. with simple calculation,
Unit–IV Statistical test	4a. Judge the hypothesis using T test 4b. Judge the hypothesis using F test 4c. Judge the hypothesis using X^2 (chi -square) test.	4.1 Study of T test with simple textile example 4.2 Study of F test with simple textile example 4.3 Study of X^2 test (chi -square test) with simple textile example
Unit–V Control charts	5a. Interpret charts by plotting X & R charts. 5b. Interpret charts by plotting P charts. 5c. Interpret charts by plotting C charts.	5.1 X chart and their application 5.2 R chart and their application 5.3 P chart and their application 5.4 C chart and their application 5.5 Interpretation of above mentioned charts.
Unit–VI International system of units for textile parameters	6a. Write international systems of units for textile. 6b. Enlist important of BIS units for textile.	6.1 Recommended B. I. S. Units for textile of the processes & sub - processes parameters .

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total marks
I	Introduction to S.Q.C. in textile	05	02	02	04	08
II	Basic statistical concept	12	05	05	10	20
III	Theoretical Distribution	10	04	04	10	18
IV	Statistical test	06	02	02	06	10
V	Control charts	08	02	02	08	12
VI	International system of units for textile parameters	01	02	00	00	02
Total		**42**	**17**	**15**	**38**	**70**

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's Revised Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF PRACTICALS
             - NA –

8. SUGGESTED LIST OF STUDENT ACTIVITIES

Visit to industry, and observe the quality control procedures being employed including the testing and measurement parameters and for data collection of quality of raw materials, work in process or final products as yarn and fabrics. Also study the SQC techniques being employed.

9. SPECIAL INSTRUMENTIONAL STRETERGY

  i. Give exercises about SQC problems and help students to solve the problems
 ii. Discuss the real life case studies of SQC

10. SUGGESTED LEARNING RESOURCES
A. List of Books

S.No.	Author	Title of Books	Publication
1	J. E .Booth	Textile Testing	Year 1996 CBS publisher
2	Tippet, Vikas gupta.	Statistical Methods for Textile Technology .	Year 1982
3	C.B. Gupta	Statistical Methods	Year 2004 Vikas publishing house.
4	Raygopalan ,Angopalan	Testing Testing part I & 2	Year 1993 S.S.M.I.T.T , Tamilnadu

B. List of Major Equipment/ Instrument

        Not Applicable

C. List of Software /Learning Websites
  i.   SPSS
  ii.   http://www.opentextbookstore.com/mathinsociety/current/Statistics.doc
  iii.   http://www.uster.com/fileadmin/customer/Services/USTER_Statistics/Application_report_The_common_quality_language_for_the_textile_industry.pdf
  iv.   http://www.massey.ac.nz/~mbjones/Book/Chapter11.pdf
  v.   http://wzr.pl/~wycinka/Descriptive%20statistics/descr.summary.sol.pdf
  vi.   http://www.fil.ion.ucl.ac.uk/spm/doc/mfd/2004/FandTtests.ppt
  vii.   https://www.fil.ion.ucl.ac.uk/spm/doc/mfd/2005/Ft-tests.ppt

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics
- **Shri R T Patel**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad
- **Shri B. B .Bhatt**, Lecturer in Textile Manufacturing, R.C Technical Institute, Ahmedabad
- **Shri S. P. Patel** ,Lecturer in Textile Manufacturing, R C technical Institute Ahmedabad
- **Smt P. M. Parmar** ,Lecturer in Textile Manufacturing, R C technical Institute Ahmedabad

Co-ordinator and Faculty Member from NITTTR Bhopal

- **Dr. C. K. Chugh**, Professor, Department of Mechanical Engineering
- **Dr. S . K. Gupta,** Professor **&** Coordinator of Gujarat State,