P.B. SIDDHARTHA COLLEGE OF ARTS & SCIENCE

Siddhartha Nagar, Vijayawada – 520 010
Autonomous -ISO 9001 – 2015 Certified

Applied Statistics for Business Analytics

Offered to: BBA (Business Analytics) / 22STAT34
Course Type: Core (Theory)
Year of Introduction:2021   **Percentage of Revision: Nil**
Semester: III Paper No. 3   **Credits:** 5
Hours Taught: 75periods per Semester   **Max.Time: 3** Hours
Course Prerequisites: Students required basic knowledge in Mathematical and Statistics techniques.

Course Description: This course provides the study of data related to time, psychology and life. Also this course also deals with the mathematical models for time series data, demand and Supply analysis

Course Objectives:
1)   To enable the students to develop basic knowledge in Applied Statistics
2)   To provide understanding in some advanced statistical techniques which are used for solving business problems.
3)   To design of sample surveys.

Learning Outcomes: At the end of the course, the student will
1)   hands on practice of working on the data and interpreting the results.
2)   Acumen to apply the techniques related solves real business problems.
3)   ability to understand the supply the required demand.

S. No	Programme Outcomes
PO1	know the applications of Statistics and learn and apply these techniques in the core course of their study
PO2	give exposure to four applied fields of statistics viz. Time Series, Index Numbers, Statistical Quality Control and Design of experiments.
PO3	understand the demand and supply analysis in business applications

Course Outcomes:

Course Outcome	Upon successful completion of this course, students should have the knowledge and skills to:	ProgrammeOutcomesMapping
CO 1	Develop the construct the Quality Control charts for Variables.	PO - 1
CO 2	Obtain knowledge on construct the Quality Control charts for Attributes	PO - 1
CO3	Understand the construction of Index numbers and able to Measure the Mortality and Fertility and Construction of Life tables	PO - 2
CO 4	Get the knowledge in design the complete random design, randomized block design and latin square design Layouts with their application to business	PO - 2
CO 5	Obtained the knowledge on demand analysis with real time applications used in industry.	PO – 3

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Statistical Quality Control-I** Introduction to Statistical Quality Control - SQC definition, Uses, Control Charts and Basis of control charts-3-σ limits. Process Control and product control - Control limits, Specification Limits and Tolerance Limits. Tools for SQC. Control charts for Variables - Control Chart for Mean $\bar{X}$-chart, Range: R- Chart and Interpretation of $\bar{X}$-chart and R charts.	**12**
II	**Statistical Quality Control-II** Control Charts for Attributes - Control chart for fraction defective p –chart - Fixed control limits and Variable control limits. Control chart for Number of defects per Unit (C-chart) - Fixed control limits and Variable control limits. Applications of C – Chart.	**12**
III	**Index numbers** Introduction, Characteristics and Uses of index numbers, Types of Index Numbers - Simple or Unweighted Index Numbers, Weighted Index numbers, Test of Adequacy for the formula of an index numbers, Cost of Living Index numbers and simple problems.	**12**
IV	**Design of Experiments** Introduction, Terminology in Experimental Designs- important terms, definitions and three principles of Experimental Designs. Completely Randomised Design (CRD), Randomised Block Design (RBD)–one observation per cell and Latin Square Design (LSD)and simple problems.	**12**
V	**Demand Analysis** Introduction, Laws of demand and supply, Price elasticity of demand and supply, Types of data - Family budget data and Time series data. Estimating methods for elasticity - Leontief's method (from time series data) and Pigou's method (from time series data).	**12**

Note: Proofs of theorems and derivations of problems and distributions are excluded.

Text Book:

1. S.C. Gupta, (2016), Seventh Edition, Fundamentals of Statistics, Mumbai: Himalaya Publishing House.

2. Fundamentals of Applied Statistics, 2014, S.C.Gupta and V.K. Kapoor; Sutan Chand &Sons , New Delhi.

Reference Books:

1. Levine, D.M., Berenson, M. L. & Stephan, D. (2012*), Statistics for managers using Microsoft Excel*, New Delhi: Prentice Hall India Pvt.

2. Aczel, A. D. &Sounderpandian, J. (2011), *Complete Business Statistics*, New Delhi: Tata McGraw Hill.

3. Sharma, J. K. (2013), *Business statistics*, New Delhi: Pearson Education

4. Anderson, D., Sweeney, D., Williams, T., Camm, J., & Cochran, J. (2013), *Statistics for Business and Economics*, New Delhi: Cengage Learning.

5.Agarwal, B.L. Basic Statistics, New Age International Publishers, New Delhi, 6th edition 2013

Websites of Interest: **http://onlinestatbook.com/rvls/index.html**

Co-Curricular Activities in the class:
1. Pictionary
2. Case Studies on topics in field of statistics
3. Snap test and Open Book test
4. Architectural – To be build the procedures
5. Extempore – Random concept to students
6. Interactive Sessions
7. Teaching through real world examples

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Max.: 70 Marks   **Min. Pass : 28 Marks**

Applied Statistics
Model Paper
Section – A

Answer the following questions   **5 x 4M = 20Marks**

1. Define SQC and write its uses (CO_1, L_1)
2. Explain 3 –σ limits (CO_2, L_4)
3. Write the applications of C- chart (CO_2, L_1)
4. Explain base shifting in index numbers(CO_3, L_4)
5. From the following data calculate Index Number by simple (i) aggregate and (ii) relative method (CO_3, L_4)

Commodity	A	B	C	D
Price in 1980	162	256	257	132
Price in 1981	171	164	189	145

6. Explain the principle of randomization in experimental design(CO_4, L_4)
7. Explain the layout of LSD(CO_4, L_4)
8. Write a short note on (i) law of demand (ii) law of supply(CO_5, L_1)

Section – B

Answer the following questions   **5 x 10M = 50Marks**

9. a. A machine is set to deliver packets of a given weight.10 samples of size 5 each were recorded. Below are given relevant data,construct mean and range chart and write your conclussions (CO_1, L_5)

Sample no	1	2	3	4	5	6	7	8	9	10
Mean	15	17	15	18	17	14	18	15	17	16
range	7	7	4	9	8	7	12	4	11	5

(OR)

b. The following data provides the measurements of the axles of bicycle wheels.12 were taken so that each sample contains the measurements of 4 axles. The measurements which were more than 5 inches are given here obtain controllimits for mean and range charts and also comment on the nature of the process (CO_1, L_5)

139, 140, 142, 136, 145, 146, 148, 145, 140, 140, 141, 138
140, 142, 136, 137, 146, 148, 145, 146, 139, 140, 137, 140
145, 142, 143, 142, 146, 149, 146, 149, 146, 147, 141, 139
142, 144, 144, 139, 141, 142, 146, 144, 146, 144, 138, 139,

10. a. The following data gives the number of defectives in 10 independent samples of varying sizes from a production process (CO_2, L_5)

Sample number	1	2	3	4	5	6	7	8	9	10
Sample size	2000	1500	1400	1350	1250	1760	1875	1955	3125	1575
No of defectives	425	430	216	341	225	322	280	306	337	305

(OR)

b. During an examination of equal length of cloth, the following are the number of defects observed 2,3,4,0,5,6,7,4,3,2. Draw a control charts for the number of defects and comment whether the process is under control or not. (CO_2, L_5)

11. a. Calculate price index numbers for the year 2000 with 1995 as base year using Laspeyre's , Paasche's and Fisher's index numbers (CO3,L1)

Commodity	Quantity		value	
	1995	2000	1995	2000
A	100	150	500	900
B	80	100	320	500
C	60	72	150	360
D	30	33	360	297

OR

b. Find the cost of living index number by family budget method from the following data (CO3,L1)

Commodities	Base Year Price	Current Year Price	% of Weights
A	20	26	17
B	28	31	29
C	34	40	20
D	92	95	34

12. a. Analyse the following CRD (CO4,L4)

Feed	Gain in weight				
A	55	49	42	21	52
B	61	112	30	89	63
C	42	97	81	95	92
D	169	137	169	85	154

(OR)

b. Analyse the following RBD (CO4,L4)

Blocks	Yield				
1	24(1)	27(3)	20(2)	16(4)	2495)
2	22(3)	28(2)	27(1)	15(4)	22(5)
3	26(5)	19(4)	38(1)	36(3)	39(2)
4	17(5)	31(2)	28(1)	14(4)	34(3)

13. a. Define price elasticity of demand and income elasticity of demand. Point out their uses. (CO5,L3)

OR

b. The demand function for a commodity X is given by (CO5,L3)
$x = 300 - 0.5p_x^2 + 0.02p_0 + 0.05y$
Where x is the quantity demanded of X, p_x the price of X ,$p_0$the price of related commodityand y is the constant income. Compute (i) the price elasticity of demand for X (ii) the income elasticity of demand for X w.r.t. $p_0$whenp_x= 12, $p_0 = 10$ and y = 200.

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