

**ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD**  
**(Department of Business Administration)**

**BUSINESS MATHEMATICS AND STATISTICS (5528)**

**CHECKLIST**

**SEMESTER: SPRING, 2014**

This packet comprises the following material:

1. Two Text Book
2. Course Outline
3. Assignment No. 1 and 2
4. Assignment Forms (2 sets)

In this packet, if you find anything missing out of the above-mentioned material, please contact at the address given below:

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**WARNING**

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM AWARD OF DEGREE/CERTIFICATE, IF FOUND AT ANY STAGE.**
2. **SUBMITTING ASSIGNMENTS BORROWED OR STOLEN FROM OTHER(S) AS ONE'S OWN WILL BE PENALIZED AS DEFINED IN "AIOU PLAGIARISM POLICY".**

**Course: Business Mathematics and Statistics (5528) Semester: Spring, 2014**  
**Level: MBA Total Marks: 100**  
**Pass Marks: 40**

**ASSIGNMENT No. 1**

Q. 1 The administration department of PIMS Hospital Islamabad surveyed the number of days 400 randomly chosen patients stayed in the hospital after an operation.

The data are:

Days (of hospital stay):	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
Frequency:	36	18	88	42	18	18	8	10

- a) Calculate the standard deviation and mean.
  - b) According to Chebyshev's theorem, how many stays should be between 0 and 17 days? How many are actually in that interval?
  - c) How many stays can we expect between 0 and 17 days? **(20)**
- Q. 2
- a) A box contains 150 marbles: 70 are blue, and 50 of these blue marbles are swirled. The rest of them are red, and 60 of the red ones are swirled. The marbles that are not swirled are clear. What is the probability of drawing marbles that are not swirled are clear? What is the probability of drawing?
    - i) A blue marble from the jug?
    - ii) A clear marbles from the jug?
    - iii) A blue, swirled marble?
    - iv) A red, clear marble?
    - v) A swirled marble?
  - b) Amir, Waseem, Afridi, and Akhtar play the following game. Each man takes one of four balls numbered I though 4 from a jug. The man who draws ball 4

loses. The other three return their balls to the jug and draw again. Now the one who draws ball 3 loses. The other two return their balls to the jug and draw again. The man who draws ball 1 wins the game.

- i) What is the probability that Akhtar does not lose in the first two draws?
- ii) What is the probability that Afridi wins the game? **(20)**

Q. 3 a) General Co. has designed a new tire, and they don't know what the average amount of tread life is going to be. The tread life is normally distributed with a standard deviation of 295.5 kilometers.

- i) If the company samples 800 tires and records their tread life, what is the probability the sample mean is between the true mean and 350 kilometers over the true mean?
- ii) How large a sample must be taken to be 95 percent sure the sample mean will be within 150 kilometers of the true mean?

b) An X-ray technician is taking readings from his machine to ensure that it adheres to federal safety guidelines. He knows that the standard deviation of the amount of radiation emitted by the machine is 150 millirems but he wants to take readings until the standard error of the sampling distribution is no higher than 25 millirems. How many readings should he take? **(20)**

Q. 4 a) Mehwish will graduate in 3 months with a Master's degree in Business Administration. Her college's placement office indicates that the probability of receiving a job offer as the result of any given interview is about 0.08 and is statistically independent from interview to interview.

- i) What is the probability that Mehwish will not get a job offer in any of her next four interviews?
- ii) If she has three interviews per month, what is the probability that she will have at least one job offer by the time she completes her studies?
- iii) What is the probability that in her next five interviews she will get job offers on the third and fifth interviews only?

b) National Bank is considering changing the day for scheduled maintenance for the automatic teller machine (ATM) in the lobby. The average number of people using it between 8 and 9 A.M is 60, except on Friday, when the average is 90. The management decision must balance the efficient use of maintenance staff while minimizing customer inconvenience.

- i) Does knowledge of the two average figures affect the manager's expected value (for inconvenienced customers)?

- ii) Taking the data for all days together, the relative probability of inconveniencing 90 customers is quite small. Should the manager expect many inconvenienced customers if the maintenance day is changed to Friday? **(20)**

- Q. 5 A pharmaceutical firm has developed a nasal spray containing interferon, which it believes will limit the transmission of the common cold within families. In the general population, 15.1 percent of all individuals will catch a rhinovirus- caused cold once another family member contracts such a cold. The interferon spray was tested on 180 people, one of whose family members subsequently contracted a rhinovirus-caused cold. Only 17 of the test subjects developed similar colds.
- a) At a significance level of 0.05, should Farooq conclude that the new spray effectively reduces transmission of colds?
- b) What should it conclude at  $\alpha = 0.02$ ?
- c) On the basis of these results, do you think Farooq should be allowed to market the new spray? Explain. **(20)**

## **ASSIGNMENT No. 2**

**Total Marks: 100**

This assignment is a research-oriented activity. You are required to select one of the following topics according to the last digit of your roll number. For example, if your roll number is D-3427185 then you will select topic number 5 (the last digit). Visit any business/commercial organization and write a paper of about 1000 words on the topic allotted to you. Prepare two copies of this report; submit one copy to your tutor for evaluation and use other for presentation in the class, which will be held at the end of semester prior to your final examination.

- (1) Measures of Dispersion
- (2) The Poisson Distribution
- (3) The Normal Distribution
- (4) Linear Regression Analysis
- (5) System of Linear Equations and Its Application
- (6) Measures of Relationship
- (7) Sampling Methods and Techniques in Business Statistics
- (8) Measures of Trend and Seasonal Variation
- (9) Test of Hypothesis
- (0) Differentiation and their Application in Business

## **WORKSHOPS**

The workshop presentations provide students an opportunity to express their communication skills, knowledge & understanding of concepts learned during practical study assigned in assignment # 2. You should use transparencies and any other material for effective presentation. The transparencies are not the presentation, but only a tool; the presentation is the combination of the transparencies and your speech. Workshop presentation transparencies should only be in typed format:

- 1) Title page
- 2) An abstract (one page summary of the paper)
- 3) Introduction to the issue (brief history & significance of issue assigned)
- 4) Practical study of the organization (with respect to the issue)
- 5) Data collection methods
- 6) SWOT analysis (strengths, weaknesses, opportunities & threats) relevant to the issue assigned
- 7) Conclusion (one page brief covering important aspects of your report)
- 8) Recommendations (specific recommendations relevant to issue assigned)

### **GUIDELINES FOR WORKSHOP PRESENTATION:**

- Make eye contact and react to the audience. Don't read from the transparencies or from report, don't look too much at the transparencies (occasional glances are acceptable to help in recalling the topic to cover).
- A 15-minute presentation can be practiced several times in advance, so do that until you are confident enough. Some people also use a mirror when rehearsing as a substitute for an audience.

### **WEIGHTAGE OF THEORY & PRACTICAL ASPECTS IN ASSIGNMENT # 2 & WORKSHOP PRESENTATIONS**

Assignment # 2 & workshop presentations are evaluated on the basis of theory & its applicability. The weightage of each aspect would be:

Theory:	60%
Applicability (practical study of the organization):	40%

## **BUSINESS MATHEMATICS AND STATISTICS (5528)**

### **COURSE OUTLINE**

#### **Unit No.1: Descriptive Statistics**

- 1.1 Introduction to Statistics
- 1.2 Role of Statistics in Business
- 1.3 Constructing a Frequency Distribution
- 1.4 Graphing Frequency Distribution
- 1.5 Measures of Central Tendency
- 1.6 Choosing Measures of Central Tendency
- 1.7 Percentiles, Deciles, and Quartiles
- 1.8 Measures of Dispersion
- 1.9 Range and Semi-Interquartile Range
- 1.10 Variance, Standard Deviation
- 1.11 Coefficient of Variation
- 1.12 Chebyshev's Inequality

#### **Unit No. 2: Probability**

- 2.1 Sample Spaces and Events
- 2.2 Definitions of Probability
- 2.3 Addition and Multiplication rules of Probability
- 2.4 Conditional Probability
- 2.5 Baye's Theorem
- 2.6 Probability Distribution
- 2.7 Discrete Probability Distribution
- 2.8 Expected Values and Variance
- 2.9 Continuous Probability Distribution
- 2.10 Binomial Distribution
- 2.11 Poisson Distribution
- 2.12 Hypergeometric Distribution
- 2.13 The Normal Distribution

#### **Unit No. 3: Sampling and Sampling Distribution**

- 3.1 Population and Sample
- 3.2 Parameters and Estimators
- 3.3 Reasons for Sampling
- 3.4 Random Sampling
- 3.5 Stratifies Random Sampling
- 3.6 Systematic Sampling
- 3.7 Cluster Sampling
- 3.8 Sampling Distributions
- 3.9 Point and Interval Estimation

- 3.10 Determination of Sample Size
- Unit No.4: Testing of Hypothesis**
- 4.1 Rationale of Hypothesis testing
  - 4.2 Type of Errors
  - 4.3 Testing Hypothesis about One Mean
  - 4.4 Testing Hypothesis about Two Means
  - 4.5 Testing Hypothesis about Proportions
  - 4.6 Goodness of Fit
  - 4.7 Contingency Table Analysis
- Unit No.5: Regression and Correlation Analysis**
- 5.1 Functional relationship between Two Variables
  - 5.2 Scatter Diagram
  - 5.3 Linear Correlation
  - 5.4 Inferences Concerning Correlation Coefficient
  - 5.5 Linear Regression Equation
  - 5.6 Principle of Least Squares
  - 5.7 Estimating Regression Equation
  - 5.8 Coefficient of Determination
  - 5.9 Multiple Regression and Correlation Analysis
- Unit No.6: Time Series and Index Numbers**
- 6.1 Introduction to Time Series
  - 6.2 Components of Time Series
  - 6.3 Measures of trend and Seasonal Variation
  - 6.4 Time Series analysis in Forecasting
  - 6.5 Defining and Index Number
  - 6.6 Unweighted Aggregate Index
  - 6.7 Price, Quantity and Value Indices
  - 6.8 CPI and its Uses
- Unit No.7: Set Theory and System of Linear Equations**
- 7.1 Set Theory, Types of Sets
  - 7.2 Methods of representing Sets
  - 7.3 Venn Diagram
  - 7.4 Solution of Linear Systems
  - 7.5 System of Linear Equations and its Applications
  - 7.6 Linear Inequalities
  - 7.7 Quadratic Inequalities
- Unit No. 8: Matrices**
- 8.1 Introduction to Matrix
  - 8.2 Addition and Multiplication of Matrices
  - 8.3 Row Operations

- 8.4 Determinant
- 8.5 Inverse of a Matrix
- 8.6 Systems of m Equations in n Unknowns
- 8.7 Applications of Matrices in Business

**Unit No. 9: Differentiation and Integration**

- 9.1 Instantaneous rate of change
- 9.2 Rules of differentiation
- 9.3 Relative Maxima and Relative Minima
- 9.4 Test for determination of Maxima and Minima
- 9.5 Indefinite Integral
- 9.6 Definite Integral
- 9.7 Methods of Integration
- 9.8 Application in Business

***Recommended Books:***

Levin, R. I., & Rubin, D. S. (2009). *Statistics for Management* (7<sup>th</sup> Ed.). Delhi, India: Dorling Kindersley Ltd (under the license of Pearson Education).

Lind, D. A., Marchal, W. G., & Wathen, S. A. (2005). *Statistical Techniques in Business and Economics* (12<sup>th</sup> Ed.). USA: McGraw-Hill Irwin

Holcomb, Jr. (2010). *Mathematics with Applications in Management, Natural, and Social Sciences* (10<sup>th</sup> Ed.). USA: Adison Wesley Publishers.

James, T. M., Benson, P. G., & Sincich, T. (2010). *Statistics for Business and Economics* (11<sup>th</sup> Ed.). USA: Prentice Hall.

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