**ALLAMA IQBAL OPEN UNIVERSITY ISLAMABAD**

**(Department of Business Administration)**

**WARNING**

1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM THE 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 THE “AIOU PLAGIARISM POLICY”.**

**Course: Pre-Calculus (8416) Semester: Spring, 2025**

**Level: BBA (4 years)**

## Please read the following instructions for writing your assignments. (AD, BS, B. Ed, MA/MSc, MEd) (ODL Mode).

1. All questions are compulsory and carry equal marks but within a question the marks are distributed according to its requirements.

2. Read the question carefully and then answer it according to the requirements of the questions.

3. Avoid irrelevant discussion/information and reproducing from books, study guide or allied material.

4. Handwritten scanned assignments are not acceptable.

5. Upload your typed (in Word or PDF format) assignments on or before the due date.

6. Your own analysis and synthesis will be appreciated.

7. Late assignments can’t be uploaded at LMS.

8. The students who attempt their assignments in Urdu/Arabic may upload a scanned copy of their handwritten assignments (in PDF format) on University LMS. The size of the file should not exceed 5MB.

**Total Marks: 100 Pass Marks: 50**

**ASSIGNMENT No. 1**

***Note: All questions carry equal marks.***

Q. 1 Solve the following linear programming problem using the simplex method: **(20)**

Q. 2 Sarah has taken a business loan of £100,000 to expand her startup. The loan must be repaid in equal annual instalments over 10 years, with a fixed annual interest rate of 10%. Sarah plans to use the profits from her business each year to make the payments.  **(20)**

1. Calculate the annual instalment amount Sarah needs to pay to fully repay the loan within 10 years. Use the formula for loan amortization.
2. Determine the total interest Sarah will have paid by the end of 10 years.
3. Sarah is considering paying an additional £5,000 per year toward the loan principal starting in the third year. How would this extra payment impact the total interest paid and the duration of the loan?

Q. 3 A manufacturing company produces light bulbs, where each bulb has a 95% probability of meeting quality standards. The company produces 20 bulbs in a single batch.  **(20)**

1. What is the probability that exactly 18 bulbs in the batch meet quality standards?
2. What is the probability that at least 19 bulbs meet quality standards?
3. Assuming the quality standards of the bulbs follow a normal distribution with a mean lifespan of 1,000 hours and a standard deviation of 50 hours, what is the probability that a randomly selected bulb lasts between 950 and 1,050 hours?
4. How would the probability change if the batch size increases to 50 bulbs with the same quality probability of 95%?

Q. 4 Differentiate the following functions: **(20)**

Q. 5 Find the following integrals: **(20)**

1. *e3x*.d*x*
2. 1.d*x*
3. (2x2 – 4x6) d*x*
4. (5x2 – 3x + 2) d*x*

**Total Marks: 100 Pass Marks: 50**

### ASSIGNMENT No. 2

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 the other for presentation in the workshops, which will be held at the end of the semester prior to your final examination.

1. Solving Linear Programming Problems Using the Simplex Method
2. Applications of Normal Probability Distribution in Real Life
3. Optimizing Resource Allocation Using the Transportation Model
4. The Derivative: Instantaneous Rate of Change and Its Applications
5. First and Second Derivative Tests in Optimization Problems
6. Maximizing Profit Using Marginal Analysis in Business Applications
7. Integration by Parts: Breaking Down Complex Functions
8. The Power of Compound Growth in Financial Computations
9. Annuities and Their Present Value in Financial Decision Making
10. Discounted Cash Flow Analysis for Cost-Benefit Evaluation

The report should follow the following format:

1. Title page
2. Acknowledgements
3. An abstract (one-page summary of the paper)
4. Table of contents
5. Introduction to the issue (brief history & significance of issue assigned)
6. Practical study of the organization (for the issue)
7. Data collection methods
8. SWOT analysis (strengths, weaknesses, opportunities & threats) relevant to the issue assigned
9. Conclusion (one-page brief covering important aspects of your report)
10. Recommendations (specific recommendations relevant to the issue assigned)
11. References (as per APA format)
12. Annexes (if any)

**GUIDELINES FOR ASSIGNMENT # 2:**

* 1.5 line spacing
* Use headers and subheads throughout all sections
* Organization of ideas
* Writing skills (spelling, grammar, punctuation)
* Professionalism (readability and general appearance)
* Do more than repeat the text
* Express a point of view and defend it.

###### PRE-CALCULUS

**COURSE OUTLINE (8416)**

**Unit No.1: Simplex Method & Linear Programming**

1. Simplex Method (only simplex method portion)
2. Graphical Solutions
3. Corner-Point Solutions
4. Alternative Optimal Solutions
5. No Feasible Solution
6. Unbounded Solutions

**Unit No.2: Probability & Normal Probability Distribution**

1. Permutations and Continuations
2. Basic Probability Concepts
3. Experiments, Outcomes, and Events
4. Probabilities
5. Normal Probability Distribution
6. Binomial Probability Distribution

**Unit No.3: Transportation And Assignment Models**

1. The Transportation Model
2. Solutions to Transportation Models
3. Initial (Starting) Solutions
4. The Stepping Stone Algorithm
5. Computer Solution Methods
6. The Assignment Model and Methods of Solution
7. General Form and Assumptions
8. Solution Methods
9. The Hungarian Method

**Unit No.4: Differentiation**

1. Limits
2. Limits of Functions
3. Average Rate of Change
4. Average Rate of Change and Slope
5. The Derivative
6. Instantaneous Rate of Change
7. The Limit Approach to Finding the Derivative
8. Differentiation
9. Rules of Differentiation
10. Higher-Order Derivatives

**Unit No.5: Optimization: Methodology**

1. Derivatives: Additional Interpretations
2. The First Derivative
3. Concavity and Inflection Points
4. Concavity from a Different Perspective
5. The First Derivative Test
6. The Second Derivative Test
7. Higher-Order derivative Test

**Unit No.6: Optimization: Applications**

1. Revenue, Cost, and Profit Applications
2. Revenue Applications
3. Cost Applications
4. Profit Applications.
5. Marginal Approach to Profit Maximization

**Unit No.7: Integration: Introduction**

1. Anti-derivatives
2. Rules of Integration
3. Integration by Parts
4. Integration by Partial Fractions
5. Differential Equations
6. Ordinary Differential Equations
7. Solutions of Ordinary Differential Equations
8. Extension of Differential Equations

**Unit No.8: Mathematics of Finance**

1. Interest and Its Computation
2. The Power of Compound Growth
3. Single Payment Computations
4. Compound Amount
5. Present Value
6. Effective Interest Rates

**Unit No.9: Advance Mathematics in Finance**

1. Annuities
2. Annuities and Their Future Value
3. Annuities and Their Present Value
4. Determining the Size of an Annuity
5. Mortgages
6. Cost-Benefit Analysis
7. Discounted Cash Flow'
8. Extensions of Discounted Cash Flow Analysis

**Reference Books:**

Frank S. Budnick Applied Mathematics For Business Economics and the Social Sciences