ALLAMA IQBAL OPEN UNIVERSITY
(Department of Mathematics)

Course: Business Mathematics (1429) *Semester: Autumn 2025*

Level: B.A, B.Com, BBA *Total Marks: 100* *Pass Marks:50*

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) ONE WILL be PENLIZED AS DEFINED IN "AIOU PLAGLARISM POLICY"**

ASSIGNMENT No. 1
(Units 1-4)

Attempt all the questions.

Q.1 *Probability Theory*

a) *Find the sample space for choosing an odd number from 1 to 15 at random.*

b) *What is the difference between mutually exclusive events and collectively exhaustive events?*

c) *The probability that an applicant for pilot school will be admitted is 0.5. If three applicants are selected at random, what is the probability that:*

I. *All three will be admitted*

II. *None will be admitted*

III. *Only one will be admitted*

Q.2 *Random Variables*

a) *Define random variable. What is the difference between discrete random variable and continuous random variable?*

b) *The fire chief for a small volunteer fire department has compiled data on the number of false alarms called in each day for the past 360 days. Construct the probability distribution for this study.*

The data of false alarms frequency is given below

No. of Alarms	***Frequency***
0	*75*
1	*80*
2	*77*
3	*40*
4	*28*
5	*24*
6	*20*
7	*16*
	Total 360

c) *Construct the discrete probability distribution which corresponds to the experiment of tossing a fair coin three times. Suppose the random variable X equals the number of heads occurring in three tosses. What is the probability of two or more heads?*

Q.3 *Equations*

Solve the following first-degree equations:

a. $\mathbf{8x - 6 = 5x + 3}$

b. $\mathbf{-15 + 35x = 8x - 9}$

c. $\mathbf{(x + 9) - (-6 + 4x) + 4 = 0}$

Q.4 *Equations*

a) Solve the following quadratic equations using the quadratic formula:

i. $\mathbf{4x^2 + 3x - 1 = 0}$

ii. $\mathbf{4t^2 - 64 = 0}$

b) A railing is to enclose a rectangular area of 1800 square feet. The length of the plot is twice the width. How much railing must be used?

Q.5 *Linear Equations*

a) Solve the linear equation $\boldsymbol{y = 2x + 1}$.

b) A company has fixed costs of $7,000 for plant and equipment and variable costs of $600 for each unit of output. What is the total cost at varying levels of output?

c) Find the equation of the straight line that has slope $\boldsymbol{m = 4}$ *and passes through the point* ***(−1, −6).***

ALLAMA IQBAL OPEN UNIVERSITY
(Department of Mathematics)

Course: Business Mathematics (1429) *Semester: Autumn 2025*

Level: B.A, B.Com, BBA *Total Marks: 100* *Pass Marks:50*

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) ONE WILL be PENLIZED AS DEFINED IN "AIOU PLAGLARISM POLICY"**

ASSIGNMENT No. 2
(Units 5-9)

Q.1 *Matrices*

a) Find the transpose of each of the following matrices:

i. $\boldsymbol{A} = \begin{bmatrix} \mathbf{-1} & \mathbf{0} & \mathbf{0} \\ \mathbf{6} & \mathbf{9} & \mathbf{-2} \\ \mathbf{-4} & \mathbf{5} & \mathbf{1} \end{bmatrix}$

ii. $\boldsymbol{B} = \begin{bmatrix} \mathbf{6} & \mathbf{-6} \\ \mathbf{4} & \mathbf{9} \\ \mathbf{-2} & \mathbf{0} \end{bmatrix}$

b) If $\boldsymbol{A} = \begin{bmatrix} \mathbf{1} & \mathbf{2} & \mathbf{3} \\ \mathbf{-1} & \mathbf{-2} & \mathbf{3} \\ \mathbf{3} & \mathbf{4} & \mathbf{5} \end{bmatrix}$ *find* $\mathbf{4A - 3B}$.

c) The quarterly sales of wheat, cotton, and corn for the year 2010 and 2011 are represented below in the form of matrix A and B. Find the total quarterly sales of wheat, cotton, and corn for these two years.

Q.2 *Determinants and Inverses of Matrices*

a) Evaluate the following determinants:

i. $\begin{vmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{vmatrix}$

ii. $\begin{vmatrix} \boldsymbol{2a} & \boldsymbol{a} & \boldsymbol{a} \\ \boldsymbol{b} & \boldsymbol{2b} & \boldsymbol{b} \\ \boldsymbol{c} & \boldsymbol{c} & \boldsymbol{2c} \end{vmatrix}$

b) Find the inverse of the given matrix $\boldsymbol{A} = \begin{bmatrix} \mathbf{1} & \mathbf{2} \\ \mathbf{3} & \mathbf{4} \end{bmatrix}$ *using Gaussian reduction method.*

c) If $\boldsymbol{A} = \begin{bmatrix} \mathbf{1} & \mathbf{-2} & \mathbf{-3} \\ \mathbf{2} & \mathbf{0} & \mathbf{1} \\ \mathbf{-4} & \mathbf{6} & \mathbf{8} \end{bmatrix}$, *find* $|\boldsymbol{A}|$.

Q.3 *Differentiation*

a) Find the derivative of the function $\boldsymbol{f(x) = 15x^{100} - 3x^{12} + 5x - 46}$.

b) *The position of a particle moving along a straight line at time t is given by* $\boldsymbol{s = f(t) = 2t^2 + 7}$. *Find the instantaneous rate of change at* $\boldsymbol{t = 12}$ *seconds.*

c) *The production costs per week for producing x widgets in a factory is given by* $\boldsymbol{C(x) = 500 + 350x - 0.09x^2}$. *Calculate the cost to produce the 301st widget at* $\boldsymbol{x = 300}$.

Q.4 *Partial Derivatives*

a) *Find the values of* $\boldsymbol{\partial f/\partial x \text{ and } \partial f/\partial y}$ *at the point* $\boldsymbol{(4, -5)}$ *if* $\boldsymbol{f(x, y) = x^2 + 3xy^2 + y - 1}$.

b) *Find the second partial derivatives of the function* $\boldsymbol{f(x, y) = 3x^{2y} + 2y^3}$.

c) *If* $\boldsymbol{f(x, y) = x^2 + y^2 + 2xy}$, *find the critical points and determine if they are maxima or minima.*

Q.5 *Optimization*

a) *Find the interval on which f is increasing, decreasing, concave up, and concave down for* $\boldsymbol{f(x) = x^3 - 12x - 5}$.

b) *A company manufactures two types of a certain product. The joint cost function for producing x units of product A and y units of product B is given by* $\boldsymbol{c = x^2 + 3xy + 400}$. *Find the quantity of each that results in the lowest cost.*

c) *The total cost and total revenue functions for a product are*

$$\boldsymbol{C(q) = 500 + 100q + 0.5q^2 \text{ and } R(q) = 500q.}$$

Find the profit-maximizing level of output.
