# BACHELOR OF ARTS ECONOMICS (HONOURS) (BAECH)

## ASSIGNMENT

### 2024-25

### BECC 104

### Mathematical Methods in Economics-II

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THE PEOPLE'S
UNIVERSITY

**SCHOOL OF SOCIAL SCIENCES**
**INDIRA GANDHI NATIONAL OPEN UNIVERSITY**
**MAIDAN GARHI, NEW DELHI 110068**

# BECC 104 Mathematical Methods in Economics-II
## Tutor Marked Assignment

Dear Student,

As we have informed you in the Programme Guide, evaluation at IGNOU consists of two parts: i) continuous evaluation through assignments, and ii) term-end examination. In the final result, assignments of a course carry 30% weightage while 70% weightage is given for term-end examination.

You will have to do three Tutor Marked Assignments (TMA) for a six-credit course, and two TMAs for a four credit course. This Assignment has total marks add up to 100 and carry a weight of 30 %.

As mentioned in the Programme Guide, you need to submit all the assignments within the stipulated time for being eligible to appear in the term-end examination.

**Submission of the completed assignments:**

**This assignment is for students who enrolled in the BAECH programme in July 2024 and January 2025. You should submit this assignment before 31st March 2025 for those enrolling in July 2024 and 31st October 2025 for those enrolling in January 2025. Please submit the assignment at your Study Centre. Please check the website of your Regional Centre for availability of the provision of online submission.**

You must obtain a receipt from the Study Centre for the assignments submitted and retain it. If possible, keep a photocopy of the assignments with you.

The Study Centre will have to return the assignments to you after they are evaluated. Please insist on this. The Study Centre has to send the marks to the Student Evaluation Division at IGNOU, New Delhi.

# BECC 104: MATHEMATICAL METHODS IN ECONOMICS
## Tutor Marked Assignments

**Course Code: BECC 104**
**Assignment Code: ASST BECC 104/TMA/ July 2024 and January 2025**
**Total Marks: 100**

## Part A

**Answer the following Long Category questions in about 500 words each. Each question carries 20 marks. Word limit will not apply in the case of numerical questions.**

$2 \times 20 = 40$

**1**.     Consider the following two matrices

$$A = \begin{pmatrix} -1 & 1 & 2 \\ 1 & -1 & -2 \\ -2 & 2 & 4 \end{pmatrix}$$

$$B = \begin{pmatrix} 1 & 0 & -1 \\ -1 & 1 & 1 \\ 1 & -1 & -1 \end{pmatrix}$$

(i)     Find the rank of 'A' and 'B'

(ii)    Show that $(AB)^{-1} = B^{-1} A^{-1}$

(iii)   Show that $(A^{-1})^{-1} = A$

(iv)    Show that $(B^{-1})^{-1} = B$

**2.** An individual consumer consumes two commodities $X_1$ & $X_2$. The utility function is

$$U = X_1^{0.4} X_2^{0.6}$$

The price of commodity one is $P_1 = $ Rs.3.00, the price of commodity two is $P_2 = $ Rs.4.00, the individual's income per period is Rs.108. Determine the utility maximizing level of $X_1$ & $X_2$ and derive the demand curves for the two commodities.

**Part B**

**Answer the following Middle Category questions in about 250 words each. Each question carries 10 marks. Word limit will not apply in the case of numerical questions.**

3 X 10 = 30

**3**. Let $Z = f(x,y) = 3x^3 - 5y^2 - 225x + 70y + 23$.

      (i)      Find the stationary points of z.

      (ii)     Determine if at these points the function is at a relative maximum, relative minimum, infixion point, or saddle point.

**4**. Solve the following differential equation

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 10y = 0,$$

given $Y(0) = 4$

$$\frac{dy}{dx}(0) = 1$$

**5.** If $Z = f(x,y) = xy$

Find the maximum value for $f(x,y)$ if x and y are constrained to sum to 1 (That is, $x + y = 1$). Solve the problem in two ways: by substitution and by using the Lagrangian multiplier method.

**Answer the following Short Category questions in about 100 words each**

$$5 \times 6 = 30$$

**6**. Define

       a.       Adjugate of a matrix

       b.       Decomposable matrix

       c.       Singular matrix

**7**. Evaluate $\int (7x-2)\sqrt{3x+2}\ dx$

**8**. Explain the concept of maximum value function.

**9**. Let the production function by $Q = AL^a K^b$. Find the elasticity of production with respect to labour (L).

**10**. Denote by **a**, **b** and **c** the column vectors

$$\mathbf{a} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} -2 \\ 1 \\ -3 \end{pmatrix}, \mathbf{c} = \begin{pmatrix} -2 \\ -1 \\ 1 \end{pmatrix}$$

Calculate

**2a - 5b, 2a- 5b +c, a′.b,**