

BECC 104

**BACHELOR OF ARTS
ECONOMICS (HONOURS)
(BAECH)**

ASSIGNMENT

2023-24

BECC 104

Mathematical Methods in Economics-II



**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 booklet has TMAs for the core course **BECC- 104 Mathematical Methods in Economics- II** which is a six credit course. The booklet therefore has three TMAs whose total marks add up to 100 and carry a weight of 30 %.

Assignment A has Descriptive Category Questions (DCQs). These are meant for writing essay type answers, with an introduction and a conclusion. These are intended to test your ability to describe your understanding/knowledge about the topic in a systematic, to-the-point and coherent manner.

Assignment B has Middle Category Questions (MCQs). These questions require you to first analyse the topic in terms of arguments and explanations and then write the answers in a concise manner. They are meant to test your ability to distinguish, compare and contrast, or clear understanding of the concepts and processes.

Assignment C has Short Category Questions (SCQs). These questions are meant to improve your skill of recall in brief the relevant/precise information about persons, writing, events, or clear understanding of concepts and processes.

Before you attempt the assignments, please read the instructions carefully provided in the Programme Guide. It is important that you write the answers to all the TMA questions in your own words. Your answers should be within the approximate range of the word-limit set for a particular section. Remember, writing answers to assignment questions will improve your writing skills and prepare you for the term-end examination.

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 2023 and January 2024. You should submit this assignment before 31st March 2024 for those enrolling in July 2023 and 31st October 2024 for those enrolling in January 2024. 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.

We expect you to answer each question as per guidelines for each category as mentioned in the assignment. You will find it useful to keep the following points in mind:

- 1) **Planning:** Read the assignments carefully, go through the Units on which they are based. Make some points regarding each question and then rearrange them in a logical order.
- 2) **Organisation:** Be a little selective and analytic before drawing up a rough outline of your answer. Give adequate attention to your introduction and conclusion.

Make sure that your answer:

- a) is logical and coherent;
- b) has clear connections between sentences and paragraphs, and
- c) is written correctly giving adequate consideration to your expression, style and presentation.

- 3) **Presentation:** Once you are satisfied with your answer, you can write down the final version for submission, writing each answer neatly and underlining the points you wish to emphasize. Make sure that the answer is within the stipulated word limit.

Wish you all the best !

Discipline of Economics
School of Social Sciences, IGNOU, New Delhi

BECC 104: MATHEMATICAL METHODS IN ECONOMICS

Tutor Marked Assignments

Course Code: BECC 104

Assignment Code: ASST BECC 104/TMA/ July 2023 and January 2024

Total Marks: 100

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

Assignment 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, inflexion 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.

Assignment C

Answer the following Short Category questions in about 100 words each

5 X 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 \mathbf{a} , \mathbf{b} and \mathbf{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

$2\mathbf{a} - 5\mathbf{b}$, $2\mathbf{a} - 5\mathbf{b} + \mathbf{c}$, $\mathbf{a} \cdot \mathbf{b}$,