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BECE-15

Bachelor's Degree Programme
(BDP)

ASSIGNMENT
2020-21

Course Code : BECE-15
Title of the Course: ELEMENTARY MATHEMATICAL METHODS IN ECONOMICS

School of Social Sciences
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BECE-15 : ELEMENTARY MATHEMATICAL METHODS IN ECONOMICS
Assignment
2020-21

Dear Student,

As explained in the programme guide for BDP, you will have to do one assignment for this elective course in BECE-15. This is a Tutor Marked (TMA) and carries 100 marks.

Before attempting the assignment please read the instructions provided in the programme guide sent to you separately.

Submission: The completed assignments should be submitted to the Coordinator of your Study Centre.

31st March, 2021 for the students appearing in the June 2021 Term End Examination

30th September, 2021 for the students appearing in December 2021 Term End Examination

BECE-15: ELEMENTARY MATHEMATICAL METHODS IN ECONOMICS
2020-21
TMA

Programme: BDP
Course Code: BECE-15
Assignment Code: BECE-15/AST/TMA/2020-21
Max. Marks: 100

A. Long Answer Questions **2×20 = 40**
(Answer any two questions)

1. A monopolist faces the demand curve Q = 80 - P/2. The cost function is $C = Q^2$. Find the output that maximises this monopolist's profits. What are the prices at profits and that output? Find the elasticity of demand at the profit maximising output.
2. A firm in a perfectly competitive market has the following cost function:
   $C = 1/3q^3 - 5q^2 + 30q + 30$
   If the market-clearing price is 9, obtain the profit maximising level of output.

3. Consider the following Macro-Model (Multiplier – Accelerator Interaction):

   $Y_t = C_t + I_t + G_t$

   $C_t = C_0 + \alpha Y_{t-1}$

   $I_t = I_0 + \beta (C_t - C_{t-1})$

   Where $0 < \alpha < 1$; $\beta > 0$; and $G_t = G_0$

   i) Find the time path Y(t) of national income, and
   ii) Comment on the stability conditions.

4. Discuss the importance of the Hawkins-Simon conditions in input-output analysis.

B. Medium Answer Questions **3×12=36**
(Answer any three questions)

5. Using Cramer's rule solve the following equations:

(i) $x + y - 2 = 0$
$2x - y + 2 = 3$
$4x + 2y - 22 = 2$

(ii) $2x+4y = 18$
$4x-6y = 8$

6. Find the short run average cost for the production function $q = AL^{2/3}K^{1/3}$ where total cost (TC) = wL + rK, the symbols having their usual meaning.

7. Find the matrix inverse of

$$\begin{pmatrix} 7 & -8 & 5 \\ 4 & 3 & -2 \\ 5 & 2 & 4 \end{pmatrix}$$

8. Determine the eigenvalues and eigenvectors of the matrix

$$A = \begin{pmatrix} 10 & 4 \\ 1 & 2 \end{pmatrix}$$

9. i) Let $Y = \dfrac{2x^2 + 3x + 1}{3x^2 - 4x + 1}$

For what values of x will be the function be discontinuous?

ii) Show that $\dfrac{a_1x^2 + b_1x + c_1}{a_2x^2 + b_2x + c_2}$
tends to a_1/a_2 as $x \to \infty$

10. Determine the distance between the points:

i) (3,0,7) and (- 4,8, 2)
ii) (4,6,7,1) and (-3,0,2,4)
iii) The distance between the points (3,1,2,4) and (4,6,5, λ) is 200. What can be said about the value of λ ?

C. Short Answer Questions **3×8=24**
(Answer any three questions)

11. Evaluate the Limits of

$$\frac{X^2 - X - 2}{X(X-2)} \; As \; X \to 2.$$

12. If the demand function for a good is Q= 280 – 10P, what is the price elasticity of demand at P = 30 rupees?

13. If Z = f(x,y) = xy

Find the maximum value for f(x,y) if x & 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.

14. Define

a. Adjugate of a matrix
b. Decomposable matrix
c. Singular matrix

15. Determine the characteristic roots and the characteristic vectors of the matrix

$$A = \begin{pmatrix} 4 & 4 \\ 1 & 0 \end{pmatrix}$$

16. Integrate

(i) $x \; \text{Sin} \; x$
(ii) $\sqrt{(a^2 - x^2)dx}$