

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET-B

**SCHOOL OF COMMERCE
END TERM EXAMINATION – MAY/JUNE 2024**

Semester : Semester II - 2023

Course Code : BSE1005

Course Name : Advanced Mathematics for Economics

Program : B.Sc. Economics

Date : June 07, 2024

Time : 9:30 AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART - A

ANSWER ANY 5 QUESTIONS

5Q X 2M = 10M

1. Mention the shape of the Isoquant?
(CO1) [Knowledge]
2. Under the Cobb-Douglas production function, write the condition for increasing returns to scale.
(CO1) [Knowledge]
3. Define Inflexion point.
(CO2) [Knowledge]
4. Define budget line.
(CO3) [Knowledge]
5. Identify the shape of the curve, if the function of a chord is below the function of a curve.
(CO2) [Knowledge]
6. In Cobb Douglas production function, what is the value of elasticity of substitution?
(CO4) [Knowledge]
7. Describe the equation of isocost line.
(CO3) [Knowledge]

PART - B

ANSWER ANY 5 QUESTIONS

5Q X 10M = 50M

8. A consumer has utility function for goods X and Y given by
 $U(x, y) = x^{0.4}y^{0.6}$
Estimate the consumer's marginal utility for x and y?
(CO2) [Comprehension]
9. Using average fixed cost curve and average variable cost curve, explain the shape of average cost curve in the short-run.
(CO4) [Comprehension]
10. Calculate the value of the function $(x - 1)(x - 2)^2$ at its maxima?
(CO4) [Comprehension]
11. Establish the relationship between Price Elasticity of Demand and Total Revenue.
(CO2) [Comprehension]
12. Integrated the following functions:
(i) $f'(x) = \int 6x^5 - 18x^2 + 7dx$
(ii) $f'(x) = \int 6x^8 - 20x^4 + x^2 + 9dx$
(CO4) [Comprehension]
13. Solve the following system of equations using Cramer's rule:
 $2x - y = 5$
 $x + y = 4$
(CO3) [Comprehension]
14. Distinguish between consumer's surplus and producer's surplus using neatly labeled diagram.
(CO2) [Comprehension]

PART - C

ANSWER ANY 2 QUESTIONS

2Q X 20M = 40M

15. Mention the equation of the Cobb-Douglas production function. Derive the following concept mathematically:
(i) MP of Labour and Capital
(ii) Marginal Rate of Technical Substitution between Labour and Capital
(iii) Elasticity of Substitution
(iv) Factor Intensity
(v) Production Efficiency
(vi) Returns to Scale
(CO3) [Application]
16. Elucidate the producer equilibrium with the help of a suitable diagram. Employing composite function, prove the following equation mathematically:
 $MRTS_{(L,K)} = \frac{MP_L}{MP_K} = \frac{w}{r}$
(CO4) [Application]
17. (a) A flat circular plate is heated so that the temperature at any point (x, y) is $U(x, y) = x^2 + 2y^2 - x$. Find the coldest point on the plate.
(b) Find the maxima and minima of $U(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$
(CO3) [Application]