

FIRST SEMESTER M.A. DEGREE EXAMINATION, NOVEMBER 2016(Regular/Supplementary/Improvement)
(CUCSS-PG)**CC15P ECO1 C04 – QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS - I**

(Economics)

(2015 Admission Onwards)

Time: Three Hours

Maximum: 36 Weightage

Part AAnswer **all** questions*Each bunch of **four** questions carries weightage **1**.*

- A square matrix A is said to be orthogonal if:
 - $AA^T = 0$.
 - $AA^T = I$.
 - $AA^T = -I$.
 - None of these.
- A diagonal matrix in which all diagonal elements are equal is called:
 - Triangular matrix.
 - Scalar matrix.
 - Unit matrix.
 - None of these.
- A square matrix A is non-singular if:
 - $|A| > 0$.
 - $|A| = 0$.
 - $|A| \neq 0$.
 - $|A| > 1$.
- The determinant of one lower order, obtained by deleting the row and column containing that element is called:
 - Minor.
 - Co-factor.
 - Adjoint.
 - None of these.
- The value of the determinant $\begin{vmatrix} 1 & 2 & 4 \\ 3 & 5 & 7 \\ 2 & 4 & 8 \end{vmatrix}$ is:
 - 0.
 - 1.
 - 1.
 - None of these.
- The rank of the matrix $\begin{pmatrix} 3 & 2 \\ 6 & 4 \end{pmatrix}$ is:
 - 0.
 - 1.
 - 2.
 - None of these.
- For the demand function $x = \frac{27}{p^3}$, the elasticity of demand is:
 - 3 units.
 - 4 units.
 - 5 units.
 - 6 units.
- $\frac{d(e^{-3x})}{dx}$ is
 - e^{-3x} .
 - $3e^{-x}$.
 - $-e^{-3x}$.
 - $-3e^{-3x}$.
- Which of the following approximates the marginal impact on the objective function caused by a small change in the constant of the constraint:
 - the Lagrange multiplier.
 - the Jacobian.
 - the Hessian.
 - the determinant.

10. The point of intersection of demand and supply curves is known as:
 (a) Break-even point. (b) Equilibrium point. (c) Isoquants. (d) None of these.
11. $\int_0^{\frac{\pi}{2}} (1 + \cos x) dx$ is equal to :
 (a) $1 + \pi$. (b) $\frac{\pi+2}{2}$. (c) $\frac{\pi-2}{2}$. (d) None of these.
12. The probability of the intersection of two mutually exclusive events is always:
 (a) ∞ (b) 0 (c) 1 (d) None of these.

($12 \times \frac{1}{4} = 3$ weightage)

Part B (Very Short Answer Questions)

Answer any **five** questions.

Each question carries a weightage of 1.

13. Define inverse of a matrix.
14. The amount of fertilizer applied (x) and yield per plot (y) of a crop are related by an equation $y = 20.38 + 2.5x - 0.125x^2$. Find the quantity of fertilizer to be used to get maximum yield?
15. Find the total revenue function given $MR = 84 - 4Q - Q^2$.
16. State the classical definition of probability.
17. Two unbiased dice are thrown. Find the probability that the product of the numbers coming up is 12.
18. What are Isoquants?
19. Define conditional probability and independence.
20. If $P(A) = 0.30$, $P(B) = 0.78$ and $P(AB) = 0.16$, then find $P(AB^c)$.

($5 \times 1 = 5$ weightage)

Part C (Short Answer Questions)

Answer any **eight** questions.

Each question carries a weightage of 2.

21. A random variable X has the following probability function

$$f(x) = \begin{cases} k, & \text{if } x = 0 \\ 2k, & \text{if } x = 1 \\ 3k, & \text{if } x = 2 \\ 0, & \text{Otherwise} \end{cases}$$

Find $P(0 < X < 2)$.

22. What is Bayes theorem?

23. If $P(A)=0.4$, $P(B)= 0.3$, $P(AB)=0.2$ find the probability of:
- (i) At least one of the event occurs.
(ii) Exactly one of the event occurs.
24. Write short notes on:
(i) Average Cost. (ii) Marginal Revenue. (iii) Marginal Cost.
25. If A and B are ant two events (subset of sample space S) are not disjoint, then prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
26. If $y = \sqrt{\frac{1-x}{1+x}}$, find $\frac{dy}{dx}$.
27. Solve the system of equations by Crammer's rule.
 $x - 2y + 3z = 1$
 $3x - y + 4z = 3$
 $2y + y - 2z = -1$.
28. Find the marginal and the average function of the total function $TC = 35 + 5Q - 2Q^2 + 2Q^3$ at $Q = 3$.
29. A random variable X has a probability density function $f(x) = \lambda e^{-\lambda x}$; $x > 0$, $\lambda > 0$. Find the first two raw moments. Also obtain mean and variance.
30. Let A and B be two events such that, $P(A \cup B) = 0.8$, $P(A) = 0.4$ and $P(A \cap B) = 0.3$, then $P(A \cap B^c)$
31. Evaluate $\int_0^{\infty} x^2 e^{-2x} dx$.

(8×2= 16 weightage)

Part D (Essay Questions)Answer any **three** questions.*Each question carries a weightage of 4.*

32. If $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & 1 \end{pmatrix}$. Determine the determinant of A and the characteristic polynomial of A .
33. Find the characteristic equation and characteristic roots of the matrix:
 $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$.

34. Find the adjoint of the matrix and verify that $A(\text{Adj}A) = |A|I$ if $A = \begin{pmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{pmatrix}$.
35. A firm has the following total cost and demand functions: $C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50$ and $Q = 100 - p$. Find profit maximizing level of output; also find profit at this level of output.
36. Let the revenue function be given by $R = 14x - x^2$ and the cost function $C = x(x^2 - 2)$. Find the profit maximizing output and maximum profit.

(3×4= 12 weightage)
