

19P160A

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Name:.....

Reg.No.....

FIRST SEMESTER M.A. DEGREE EXAMINATION, NOVEMBER 2019

(Supplementary/Improvement)

(CUCSS-PG)

CC15P ECO1 C04 – QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS I

(Economics)

(2015 to 2018 Admissions)

Time: Three Hours

Maximum: 36 Weightage

Section A

Answer *all* questions. Each question carries ¼ weightage.

1. A diagonal matrix in which each of the diagonal element is unity is said to be
a) Triangular matrix b) Zero matrix c) unit matrix d) diagonal matrix
2. If A is a square matrix with $A^T = -A$, then A is
a) Symmetric matrix b) Skew symmetric matrix
c) Idempotent matrix d) Nil potent matrix
3. The characteristic roots of $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$
a) 5, 2 b) 1, -3 c) 1,3 d) 1, -2
4. A square matrix A is said to be idempotent if
a) $A = A^2$ b) $A = A^T$ c) $A = -A^T$ d) $A^P = 0$
5. The value of the determinant $\begin{bmatrix} a & 0 & b \\ 0 & b & 0 \\ b & 0 & c \end{bmatrix}$ is
a) $abc - b^3$ b) $abc - a^3$ c) $abc - c^3$ d) None of these
6. The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 5 & 7 \end{bmatrix}$ is
a) 0 b) 1 c) 2 d) 3
7. The elasticity of supply $p = \frac{3}{x^2}$ is (where p is the price and x is the supply)
a) 1 b) 2 c) $\frac{1}{2}$ d) None
8. $\frac{d}{dx}(\sqrt{x})$ is
a) $2\sqrt{x}$ b) $\frac{1}{2\sqrt{x}}$ c) \sqrt{x} d) $\frac{1}{\sqrt{x}}$
9. A positively sloped curve moves
a) Upward b) Downward c) Horizontally d) Vertically

10. The function $y = 3x^2 - 14x + 5$ is increasing when x is equal to
 a) 4 b) 5 c) 7 d) 9
11. Given a supply function $Q_s = -5 + 3p$ and demand function $Q_d = 10 - 2p$, then the equilibrium price is
 a) 2 b) 3 c) 6 d) 5
12. The value of $\int_0^1 x^2 dx$ is
 a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) $\frac{1}{9}$ d) $\frac{1}{27}$

(12 x ¼ = 3 Weightage)

Section B

Answer any **five** questions. Each question carries 1 weightage.

13. Define rank of a matrix.
14. State Cayley Hamilton theorem.
15. Cost function of a firm is given by $C = x(x^2 - 2)$. Find the marginal cost when the production is 2 units.
16. Find the elasticity of demand for the function $y = 100 - x - x^2$ when $y = 70$
17. Optimise the function $f(x) = x^5 - 5x^4 + 5x^3 - 10$
18. Find $\int x \log x dx$
19. Two cards are drawn from a well shuffled pack of 52 cards. What is the probability that both are spades?
20. State the classical definition of probability.

(5 x 1 = 5 Weightage)

Section C

Answer any **eight** questions. Each question carries 2 weightage.

21. If $A = \begin{bmatrix} 3 & 5 & 7 \\ 2 & -3 & 1 \\ 1 & 1 & 2 \end{bmatrix}$, Find A^{-1}
22. Find the characteristic equation and characteristic roots of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$
23. Show that $A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$ is orthogonal
24. If $y = \sqrt{x^2 + 7}$ Find the $\frac{dy}{dx}$
25. Find the maximum and minimum values of the function $y = x^3 - 9x^2 + 15x + 3$
26. Find the first order and second order partial derivatives of $Z = 3x^3 - 2xy^2 + 2x^2y + y^3 + 8$

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27. Define a random variable. Evaluate k if $f(x) = k; x = 1, 2, 3, 4, 5, 6$ and $f(x) = 0$, elsewhere, is a probability mass function.
28. Evaluate k if the following is a probability distribution.
 $f(0) = \frac{k}{2}, f(1) = \frac{k}{5}, f(2) = \frac{k}{20}, f(3) = \frac{k}{4}$ and $f(x) = 0$ elsewhere.
 Also find (i) $P(X \leq 2)$ (ii) $P(0 < X < 3)$
29. State and prove Bayes theorem of probability.
30. A problem in statistics is given to 3 students A, B and C. Their chances of solving the problem are $\frac{1}{2}, \frac{1}{4}$ and $\frac{3}{4}$ respectively. Find the probability that the problem is solved.
31. If the marginal cost function $MC = 2 + x + x^2$, x being the quantity produced. If the fixed cost is 50 units, find the total cost function. What is the total cost when 50 units are produced?

(8 x 2 = 16 Weightage)

Section D

Write essays on any **three** of the following. Each question carries 4 Weightage

32. Solve the system of equations by Cramer's rule. $x + y + z = 6, x + 2y + 3z = 14,$
 $x + y - z = -2$
33. The probabilities of X, Y and Z becoming managers are $\frac{4}{9}, \frac{2}{9}$ and $\frac{1}{3}$ respectively. The probability that the bonus scheme will be introduced if X, Y and Z becomes managers are $\frac{3}{10}, \frac{1}{2}$ and $\frac{4}{5}$ respectively. What is the probability that the manager appointed was X given that the bonus scheme is introduced?
34. Given $TR = 1400Q - 6Q^2, TC = 1500 + 80Q$. Find the profit maximizing level of output.
35. A random variable x has the probability density function $f(x) = 6x(1-x)$ for $0 \leq x \leq 1$. Find the first two moments about mean. Also find the mean and variance
36. Integrate the following functions
 a) $\int x^2 e^{3x} dx$ b) $\int_0^1 (3x^2 - 4x^3) dx$ c) $\int x \log x dx$

(3 x 4 = 12 Weightage)

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