5 Sem

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Reg. No.....

FIRST SEMESTER M.A. DEGREE EXAMINATION, DECEMBER 2016

(CUCSS)

Economics

ECO 1C 04—QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS—I (2015 Admissions)

Time: Three Hours

Maximum: 36 Weightage

Part A (Multiple Choice)

Answer all the twelve questions. Each question carries a weightage of 1/4.

1. If
$$A = \begin{bmatrix} 3 & 4x \\ -1 & 6 \end{bmatrix}$$
 and $B = \begin{bmatrix} 3 & 8 \\ -1 & 3x \end{bmatrix}$ and $A = B$ then x is:

(a) 6.

(b) 3.

(c) 2.

- (d) -1.
- 2. For an orthogonal matrix A:
 - (a) $A^T = A$.

(b) $A^TA = I$.

(c) $A^2 = A$.

- (d) $\bar{\mathbf{A}}^{\mathrm{T}} = \mathbf{A}$.
- 3. The signed minor is called:
 - (a) Inverse.

(b) Co-factor.

(c) Orthogonal.

- (d) Adjoint.
- 4. For an idempotent matrix A:
 - (a) $A^T = A$.

(b) $A^TA = I$.

(c) $A^2 = A$.

(d) $\bar{\mathbf{A}}^{\mathrm{T}} = \mathbf{A}$.

5. $\lim_{x\to 3} \frac{x^2-9}{x-3}$ is:

(b) 3.

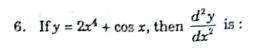
(a) 0.(c) 6.

(d) 9.

32-9

3-3 29

Turn over



(a) $24x^2 - \frac{\cos x}{x}.$

(b) $24x^2 - \cos x$.

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(c) $24x^2 - \sin x$.

(d) $4x + \cos x$.

 $\int_0^\infty e^{-2x} dx \text{ is :}$

(a) $\frac{1}{2}$.

(b) 2.

(c) $\frac{-1}{2}$.

(d) -2.

8. If A and B are mutually exclusive events, then $P(A \cup B)$ is:

- (a) $P(A) + P(B) P(A \cap B)$.
- (b) P(A) + P(B).
- (c) $P(A) + P(B) P(A) \cdot P(B)$.
- (d) $P(A) \cdot P(B/A)$.

9. If A and B are any two events and P(A) = 0.5, P(B) = 0.6, $P(A \cap B) = 0.3$ then $P(A \cup B)$ is:

(a) 0.2.

(b) 0.4.

(c) 0.8.

(d) 0.65.

10. For any two independent events A and B, $P(A \cap B)$ is:

(a) P(A) + P(B).

(c) $P(A) \cdot P(B)$.

(d) P(A)-P(AB).

(d) P(A)-P(AB).

(d) P(A)-P(AB).

11. If A and B are two dependent events then P(A/B) is:

(a) $\frac{P(A \cap B)}{P(A)}$.

(b) $\frac{P(A \cap B)}{P(B)}$

P(B).

(d) $\frac{P(\overline{A} \cap B)}{P(A)}$.



D 13382 If X is a discrete random variable, and F(x) is the cumulative density function, then the probability mass function p(x) is: COF x. P(X)

(a) F(x+1) - F(x).

(b) F(x) - F(x-1).

(c) F(x) - F(x + 1).

(d) F(x+1) - F(x-1).

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

Part B (Very Short Answers)

Answer any five questions.

Each question carries 1 weightage.

13. If
$$A = \begin{pmatrix} 1 & 2 \\ 3 & -4 \end{pmatrix}$$
, $B = \begin{pmatrix} 2 & -7 \\ 5 & 8 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$ then find $A + 2B - C$.

14. Find the co-factors of 2 and 3 in $\begin{pmatrix} 2 & 1 & 5 \\ 3 & 4 & 2 \\ 6 & 8 & 4 \end{pmatrix}$.

15. For the cost function $c(x) = 1 + 2x + 3x^2$, find the marginal cost of producing 10 units.

16. If $y = 2x^3 + \log x$, then find $\frac{d^2y}{dx^2}$.

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17. Differentiate $\frac{(5x-2)^2}{x-3}$ with respect to x and hence find the stationary points.

Turn over

- 18. Evaluate $\int_0^{\infty} 6e^{-3x} dx$.
- Define the terms random experiment and sample space.
- Find the probability of drawing any one spade card from a pack of cards.

 $(5 \times 1 = 5 \text{ weightage})$

Part C (Short Answers)

Answer any eight questions. Each question carries 2 weightage.

21. Find the rank of the matrix $\begin{pmatrix} 3 & 1 & 4 & 2 \\ 1 & 2 & 3 & -1 \\ 2 & 1 & 6 & 2 \end{pmatrix}$.

22) Find A⁻¹, if A =
$$\begin{bmatrix} 9 & 7 & 3 \\ 5 & -1 & 4 \\ 3 & 4 & 1 \end{bmatrix}$$
.

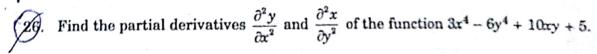
 $\begin{array}{c} (23.) \text{ Find characteristic roots of } \begin{pmatrix} 2 & 1 & 5 \\ 0 & 3 & 1 \\ 0 & 0 & 4 \end{pmatrix}.$



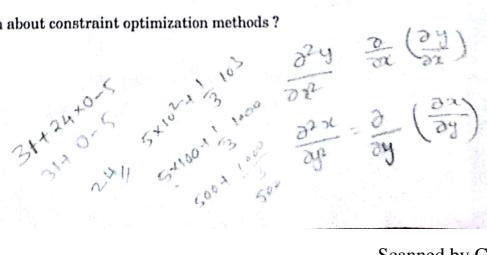
Find the maxima and minima of the total cost function

$$TC = 31 + 24Q - 5, 5Q^2 + \frac{1}{3}Q^3.$$

Find the slope of the function $x^3 - 14x^2 + 24 = 0$ at x = 2 and at x = -3.



27. Explain about constraint optimization methods?





28. A problem in Statistics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$,

 $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?

29, Explain Baye's theorem on conditional probability and give its uses.

(30) If the p.m.f. of a random variable X is:

$$p(x) = \frac{x}{15}$$
, $x = 1, 2, 3, 4, 5$
= 0, otherwise

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Find (i) $P\{X = \text{multiple of 2 or 4}\}$; (ii) $P\{\frac{3}{2} < X < \frac{9}{2}\}$; and (iii) $P\{\frac{3}{2} < X < \frac{9}{2} | X > 3\}$.

Define mathematical expectation. The probability that a man fishing at a particular place will, catch 1, 2, 3, 4 fish are 0.4, 0.3, 0.2 and 0.1 respectively. What is the expected number of fishes caught?

 $(8 \times 2 = 16 \text{ weightage})$

2+2 42

Part D (Essays)

Answer any three questions. Each question carries 4 weightage.



The demand and supply functions of three commodities X, Y, Z are given as:

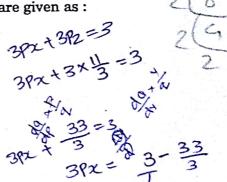
$$d_x = 23 - 5p_x + 3p_y - 3p_z$$
; $S_x = 3 + p_x$.

$$23 - 5p_x + 3p_y - 3p_z$$
; $S_x = 3 + p_x$.

$$d_y = 12 + 3p_x + 6p_y + 3p_z$$
 ; $S_x = 15 + 6p_y$.

$$d_z = 64 - 3p_x - 3p_y - 9p_z$$
; $S_x = 10 + 6p_z$.

Obtain the equilibrium prices and quantities.



33. If p_t be the price, x_t the per capita quantity, y_t the per capita disposable income at time t and the demand function is:

$$\log p_i = 0.618 - 2.27 \log x_i + 1.31 \log y_i.$$

Compute the price elasticity and income elasticity of demand.



In a bolt manufacturing factory machines A, B and C manufactures respectively 50%, 30% and 20% of the total. Of their output 4, 5, 2 percents are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C?

Turn over

- 35. A bag contains 30 balls numbered from 1 to 30. One ball is drawn at random. Find the probability that the number on the ball drawn will be a multiple of (i) 5 or 6, (ii) 3 or 4, (iii) 5 and 3. A reward of Rs. 100 is given if the number on the selected ball is a multiple of 5 or 6 and reward of Rs. 150 and Rs. 200 are given if the selected number is a multiple of 3 or 4, 5 and 3 respectively. Find the expected reward obtained.
- A random variable X assumes the values -3, -2, -1, 0, 1, 2, 3 such that P(X = -3) = P(X = -2) = P(X = -1), P(X = 1) = P(X = 2) = P(X = 3) and P(X = 0) = P(X > 0) = P(X < 0). Obtain the probability mass function of X and distribution function of X.

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

6+5-30 6+10 10-6