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## FIRST SEMESTER M.A. DEGREE EXAMINATION, DECEMBER 2017

(CUCSS)

Economics

EC 01 C04—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 ¼.

1. If  $\begin{pmatrix} 5 & k+2 \\ k+1 & -2 \end{pmatrix} = \begin{pmatrix} k+3 & 4 \\ 3 & -k \end{pmatrix}$ , then k is:

(a) -1.

(b) -2.

(c) 0

(d) 2.

2. For a symmetric matrix A:

(a)  $A^T A = I$ .

(b)  $A^T = A$ .

(c)  $A^2 = A$ .

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

3. The characteristics roots of  $A = \begin{pmatrix} 1 & 2 \\ 0 & 4 \end{pmatrix}$  are:

(a) 1 and 2.

(b) 1 and 4.

(c) 0 and 2.

d) 0 and 8.

4. The transpose of the co-factor matrix is called:

(A)

(a) Minor.

(b) Inverse.

(c) Adjoint.

(d) Symmetric matrix.

 $-5. \quad \lim_{x\to 0} \frac{\sin(3x)}{x} \text{ is :}$ 

(a) 0.

(b) 3.

(c) 1.

(d) 2.

6. The derivative of  $y = 5x^4$  with respect to x is:

(a)  $20x^3$ .

(b)  $12x^4$ .

(c)  $20x^5$ .

(d)  $4x^3$ .

Turn over

- 7. Marginal function is:
  - (a) Ratio of total function and price.
  - (c) Derivative of the total function.
- b) Product of total function and x.
- (d) Product of average function and x.

- 8.  $\int_0^{\frac{\pi}{2}} (1 + \cos x) dx$  is:
  - (a)  $\frac{\pi}{2}$ .

(b)  $1 + \frac{\pi}{2}$ 

(c) 1.

- (d)  $1-\frac{\pi}{2}$
- 9. If A and B are independent events and P(A) = 0.5, P(B) = 0.3, then  $P(A \cup B)$  is:
  - (a) 0.8.

(b) 0.15.

(c) 0.7.

- (d) 0.65.
- 10. If A and B are any two events and P(A) = 0.5, P(B) = 0.6,  $P(A \cup B) = 0.8$  then  $P(A \cap B)$  is:
  - (a) 0.2.

(b) 0.3.

(c) 0.4.

- (d) 0.6.
- 11. For any two events A and B, P(A)-P(B) is:
  - (a)  $P(A \cap B)$ .

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

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

- (d)  $P(\overline{A} \cap \overline{B})$ .
- 12. For a continuous random variable,  $P(a < x \le b)$  is:
  - (a) F(b) F(a).

- (b) F(a) F(b).
- (c) F(b+h)-F(a-h).
- (d) F(b+h)-F(a+h).

## Part B (very Short Answer)

Answer any five questions.

Each question carries 1 weightage.

- 13. Given that  $A = \begin{pmatrix} 5 & 3 & 2 \\ 4 & 2 & 1 \end{pmatrix}$  and  $B = \begin{pmatrix} 2 & 3 & 4 \\ 1 & -1 & 2 \end{pmatrix}$ . Find C such that A + B 2C = 0, where 0 is a null matrix of order  $2 \times 3$ .
- 14/If  $A = \begin{pmatrix} 1 & 2 & 0 \\ 3 & -4 & 2 \end{pmatrix}$ ,  $B = \begin{pmatrix} 2 & -7 \\ 5 & 8 \\ 2 & 1 \end{pmatrix}$ . Show that  $(AB)^T = B^T \cdot A^T$ .

15. For the cost function  $c(x) = 3x^2 + 2x$ , find the marginal cost for an output of 4 units.

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

- 17. Evaluate  $\int_0^x 4e^{-4x} dx$ .
  - 18. State the addition theorem for two events A and B.
  - 19/ In the process of manufacture of part, A, 10 out of 100 are likely to he defective. Similarly, 6 out of 100 are likely to be defective in the manufacture of part B. Calculate the probability that the assembled part will be defective.
  - 20./ State Baye's theorem.

## Part C (Short Answer)

Answer any eight questions. Each question carries 2 weightage.

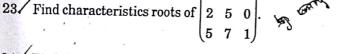


21. Given 
$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 4 & 5 & 4 \end{pmatrix}$$
. Show that A is non-singular.

22. Obtain the equilibrium prices of the following market model:

$$\begin{array}{ll} qd_1 = 12 + p_1 - 2p_2 & qs_1 = -2 + 3p_2 \\ qd_2 = 18 - 3p_1 + p_2 & qs_2 = -2 + 4p_1 \end{array}$$

23 Find characteristics roots of 
$$\begin{pmatrix} 9 & 0 & 0 \\ 2 & 5 & 0 \\ 5 & 7 & 1 \end{pmatrix}$$
.



- 24 Find the maxima and minima of the function  $f(x) = (x-2)^2 (x+3)$ .
- 25. Find the slope of the function  $2x^3 + 6x^2 + 6$  at x = -2 and at x = 3.

26. Find the partial derivatives 
$$\frac{\partial^2 y}{\partial x^2}$$
 and  $\frac{\partial^2 x}{\partial x \partial y}$  of the function  $2x^4 - 4y^3 + 2y^2 - 8xy + 9$ .



- 27. Explain the Lagrangian method of multipliers in optimization?
- 28/ If two dice are thrown, what is the probability that the sum is (a) greater than 8, and (b) neither 7 nor 11.

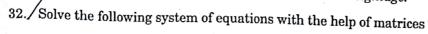
Turn over

- 29./ A bag contains 6 white balls. 4 red balls and 8 blue balls. Two ball aredrawn at random. Find the probability that they are (i)white and blue, (ii) both are red, and (iii) beth are blue.
- 30. If A, B and C are independent events show that  $A \cup B$  and C are also independent.
- 31/ The probability that there is at least one error in an accounts statement prepared by A is 0.4 and for B and Cthey are 0.3 and 0.6 respectively. A, B and C prepared 10, 16 and 20 statements respectively. Find the expected number of correct statements in all.

## Part D (Essay)

Answer any three questions.

Each question carries 4 weightage.

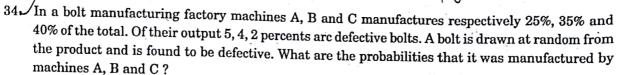


$$x + 2y + 3z = 14$$
;  $3x + 2z = 11 - y$ ;  $2x + 3y = 11 - z$ .

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:

$$\log p_t = 0.768 + 4\log x_t - 21\log y_t,$$

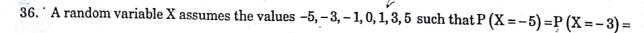
Compute the price elasticity and income elasticity of demand.



- 35  $\chi$ (a) Two ideal dice are thrown. Let  $X_1$  be the score on the first die and  $X_2$  denote the score on the second die. Let Y denote the maximum of  $X_1$  and  $X_2$ :
  - (i) Write down the joint distribution of Y and X1.
  - (ii) Find the mean and variance of Y.
  - (b) Let X be a random variable with the following probability distribution:

$$x$$
 :  $-3$  6 9
$$P(X = x) : \frac{1}{6} \frac{1}{2} \frac{1}{2}$$

Find E (X), E ( $X^2$ ) and V (X).



$$P(X = -1), P(X = 1) = P(X = 3) = P(X = 5) \text{ and } 2P(X = 0) = P(X > 0) = P(X < 0). \text{ Obtain } 1 = P(X = 1) = P(X = 1)$$

the probability mass function of X and distribution function of X.

E(X)

