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Name: .....

Reg. No.....

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

(Regular/Supplementary/Improvement)

(CUCSS-PG)

**CC15P ECO1 CO3 –QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS I**

(Economics)

(2015 Admission onwards)

Time: Three Hours

Maximum: 36 Weightage

**PART A**

Answer *all* the questions. Each question carries 1 weightage.

1. A diagonal matrix in which each of the diagonal elements unity is called  
a) unit matrix b) triangular matrix c) diagonal matrix d) zero matrix
2. The characteristic roots of  $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  are (a) -1,2 (b) 1,-3 (c) 1,3 (d) 1,-2
3. The value of the determinant  $\begin{vmatrix} 0 & 1 & 1 \\ 1 & 1 & 4 \\ 1 & 4 & 9 \end{vmatrix}$  is (a) 2 (b) -1 (c) 1 (d) -2
4. If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 6 & 9 \\ 2 & 4 & 6 \end{bmatrix}$  then rank of A is (a) 3 (b) 2 (c) 1 (d) none of these
5. If  $y = \sqrt{x^2 + 7}$  the value of  $\frac{dy}{dx}$  is  
a)  $\frac{1}{2\sqrt{x^2+7}}$  b)  $\sqrt{2x}$  c)  $\frac{x}{\sqrt{x^2+7}}$  d)  $\frac{2x}{\sqrt{x^2+7}}$
6. The value of  $\int_0^1 e^{-x} dx$  is  
a)  $e^{-1}$  b)  $\frac{1}{e} - 1$  c)  $1 - e$  d)  $1 - \frac{1}{e}$
7. If  $3x + 4y = 6$  then  $\frac{dy}{dx} =$   
(a)  $\frac{4}{3}$  (b)  $\frac{3}{4}$  (c)  $\frac{-3}{4}$  (d) none of these
8. If the demand law for certain commodity is  $P = 25 - 2q$  and the equilibrium price for the product is Rs.15 then the consumers surplus is  
(a) 75 (b) 100 (c) 25 (d) none of these
9. An event whose occurrence is inevitable is called:  
(a) Certain event. (b) Impossible event. (c) Compound event. (d) None of these.
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.

**Turn over**

11. If A and B are two independent events, then  $P(\bar{A} \cap \bar{B})$

- (a)  $P(\bar{A})P(\bar{B})$ . (b)  $P(\bar{A})P(B)$ . (c)  $P(A)P(\bar{B})$ . (d) None of these.

12. The second central moment is:

- (a) Standard Deviation. (b) Variance. (c) Skewness. (d) None of these.

(12 x 1/4 = 3 Weightage)

### PART B

(Very Short Answer Questions)

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

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  $P(ABC)$ .

(5×1 = 5 Weightage)

### PART C

(Short Answer Questions)

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

21. Evaluate k if the following is a probability density function. Also obtain  $P(0 \leq x \leq 2)$ .

X : 0 1 2 3

P(x) :  $\frac{1}{6}$   $\frac{1}{10}$   $\frac{k}{10}$   $\frac{1}{30}$

22. If  $p(x) = \begin{cases} kx, & x = 1, 2, 3, 4, 5 \\ 0 & \text{elsewhere} \end{cases}$  is a probability distribution, evaluate i) k, ii)  $P(X = 2.65)$

23. What is Bayes theorem?

24. State and prove addition theorem of probability.

25. If  $A = \begin{pmatrix} 1 & 3 \\ -1 & 2 \end{pmatrix}$  Show that it satisfies the characteristic equation.



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26. Obtain the sample space and probability distribution of the number of heads when three coins are tossed together.
27. If  $y = \sqrt{\frac{1-x}{1+x}}$  find  $\frac{dy}{dx}$
28. Determine the maxima and minima values of the function  $y = x^3 - 6x^2 + 9x - 5$ .
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. What are the applications of differentiation in economics ?.
31. Find the first and second order partial derivatives of the function  $z = 2x^3 - 3x^2y + 4xy^2 + y^3 + 8$ .  
(8×2= 16 Weightage)

**PART D**

(Essay Questions)

Answer any **three** questions. Each question carries 4 weightage.

32. Solve using Cramers rule the following equations
- $$\begin{aligned} 3x + y + z &= 8 \\ x + y + z &= 6 \\ 2x + y - z &= 1 \end{aligned}$$
33. Find the inverse of the matrix  $A = \begin{pmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{pmatrix}$
34. Revenue function of a firm is given by  $R = 14x - x^2$  and the cost function is  $T = x(x^2 - 2)$ .  
Find the Average cost, Marginal cost, Marginal revenue and Equilibrium level of output.
35. If  $P(A) = 0.3$ ,  $P(B) = 0.2$ ,  $P(AB) = 0.1$  Find the probabilities of
- at least one of the events occurs
  - Exactly one of the events occur
  - None of the events occur
36. Integrate the following functions:  $(x - 1)^5 dx$   $(3x^4 - 4x^5) dx$
- a)  $\int (x - 1)^5 dx$     b)  $\int_0^1 (3x^4 - 4x^5) dx$     c)  $\int \frac{\log x}{x} dx$

(3x4 = 12 Weightage)

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