

19P160

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Name:.....

Reg.No.....

FIRST SEMESTER M.A. DEGREE EXAMINATION, NOVEMBER 2019

(CUCSS PG)

CC19P ECO1 C04 – QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS I

(Economics)

(2019 Admission Regular)

Time: Three Hours

Maximum: 30 Weightage

**Part A**

Answer *all* questions. Each question carries  $\frac{1}{5}$  weightage.

1. A square matrix A is said to be orthogonal if  
a)  $AA^T = 0$                       b)  $AA^T = 1$                       c)  $AA^T = -1$                       d) None of these
2. The rank of the matrix  $\begin{bmatrix} 3 & 2 \\ 6 & 4 \end{bmatrix}$  is  
a) 0                                      b) 1                                      c) 2                                      d) None of these
3. The characteristic roots of  $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$  are  
a) 1,2                                      b) 1,3                                      c) 1,5                                      d) 1,4
4. A positively sloped curve moves  
a) Upward                                      b) Downward                                      c) Horizontally                                      d) Vertically
5. Find  $\lim_{x \rightarrow 2} \frac{x^2 - 4x}{x + 2}$
6. If  $Z = x^2 + 3xy - 4y^2$ , then  $\frac{\partial Z}{\partial x} =$   
a)  $2x + 3y$                                       b)  $3x - 8y$                                       c)  $2x + y$                                       d)  $2 + 3xy$
7.  $\frac{d\sqrt{x}}{dx}$  is  
a)  $2\sqrt{x}$                                       b)  $\frac{1}{2\sqrt{x}}$                                       c)  $\sqrt{x}$                                       d)  $\frac{1}{\sqrt{x}}$
8. For the cost function  $C = x(x^2 - 2)$ , the marginal cost when the  $x = 2$  is  
a) 5                                      b) 10                                      c) 12                                      d) 7
9. Which of the following areas can the difference equation be applied?  
a) Cob- Web model                                      b) Harrod Domar model  
c) Both a and b                                      d) None of these
10. What is the order of the differential equation  $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 8y = 0$ ?  
a) First                                      b) Second                                      c) Third                                      d) None of these

11. The 14th term of the series 13, 17, 21, 25, ... is  
 a) 268                      b) 120                      c) 39                      d) 65
12. The value of  $\int_{-1}^1 (3x^2 - 4x^3) dx$  is  
 a) 0                      b) 1                      c) 2                      d) None of these
13. Given a function F(y, t). Let  $M = \frac{\partial F}{\partial y}$  and  $N = \frac{\partial F}{\partial t}$ . Then the exact differential equation is  
 a)  $Mdt + Ndy = 0$                       b)  $Mdy + Ndt = c$                       c)  $Mdt + Ndy = c$                       d)  $Mdy + Ndt = 0$
14. The function  $y = -2x^3 + 4x^2 + 9x - 10$  is concave when x is equal to  
 a) 11                      b) -5                      c) -7                      d) 3
15. The finite difference given by  $\Delta y_{t+1} - \Delta y_t$  is called  
 a) First finite difference                      b) Second finite difference  
 c) Third finite difference                      d) None of these

(15 x 1/5 = 3 Weightage)

**Part B** (Very short answer questions)

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

16. Define exponential function.
17. Define limit of a function.
18. Show that  $\begin{bmatrix} 2 & -1 & 3 \\ -1 & 2 & 1 \\ 3 & 1 & 4 \end{bmatrix}$  is symmetric.
19. Examine whether the function  $y = 100 - x - 2x^2$  is monotonic increasing or decreasing when  $X > 0$
20. If  $y = \frac{x^2-1}{x^2+1}$ , find  $\frac{dy}{dx}$
21. Distinguish between implicit and explicit functions.
22. If  $D = 250 - 50p$  and  $S = 25p + 25$  are demand and supply function calculate equilibrium price.
23. Write down the general formula for first order Linear Differential Equation.

(5 x 1 = 5 Weightage)

**Part C** (Short answer questions)

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

24. A person had deposited ` 20,000 each in two banks, A and B. Both of the banks offer 6 percent rate of interest. However, in bank A interest is compounded annually, while in bank B it is compounded half-yearly. After 3 years what will be the difference in the amount of interest that he may get from bank A and bank B?

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25. Find the inverse of the matrix A where  $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

26. Show that  $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

27. Show that  $f(x) = \begin{cases} 5-x, & x \leq 5 \\ 1, & x > 5 \end{cases}$  is discontinuous at  $x = 5$

28. Find the first order and second order partial derivatives of

$$Z = 3x^3 - 2xy^2 + 2x^2y + y^3 + 8$$

29. Evaluate  $\int x^2 e^{3x} dx$

30. Solve  $\frac{dy}{dx} + \frac{x}{y} = 0$ . Also Find particular solution when  $x = 2, y = 1$

31. Optimise the function  $f(x) = x^2 - 8x + 25$

32. The marginal cost function for a certain product is  $MC = 3q^2 - 4q + 5$ . Find the total cost function given the fixed cost is ` 100

33. Find the sum of natural numbers in between 200 and 400 which are exactly divisible by 7

(7 x 2 = 14 Weightage)

**Part D** (Essay questions)

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

34. Find the characteristic equation and characteristic roots of the matrix  $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

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. Integrate the following functions

a)  $\int x^2 e^{3x} dx$                       b)  $\int_0^1 (3x^2 - 4x^3) dx$                       c)  $\int x \log x dx$

37. Optimize the function  $f(x, y) = xy$  subject to the constraint  $x^2 + y^2 = 8$

(2 x 4 = 8 Weightage)

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