

C 33085

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Name.....

Reg. No.....

FIRST SEMESTER P.G. DEGREE EXAMINATION, DECEMBER 2017

(CCSS)

Economics

ECO 1C 03--MATHEMATICS FOR ECONOMICS

(2013 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A

Answer all questions.

Each question carries 1 mark.

1. The determinant of $\begin{bmatrix} 4 & 0.21 & 16 \\ 1 & 0.13 & 4 \\ 5 & 0.40 & 20 \end{bmatrix}$ is :

(a) 0.

(b) 1.

(c) 2.

(d) 5.

2. Given the indifference curve $U^0 = XY$, the Marginal Rate of Substitution of X for Y is :

(a) $\frac{Y}{X}$.

(b) $-\frac{Y}{X}$.

(c) $\frac{X}{Y}$.

(d) $-\frac{X}{Y}$.

3. The function $y = \log x - x$ is stationary when the value of x is :

(a) 1.

(b) 0.

(c) -1.

(d) 2.

4. When the marginal revenue curve of a firm is $MR = 2 - X$, the total revenue curve is :

(a) $2X - X^2$.

(b) $X^2 - 2X$.

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

(d) $2X - 0.5X^2$.

Turn over

5. If the correlation coefficient of X on Y is denoted by r_{XY} and that of Y on X by r_{YX} , then which of the following is true ?
- (a) $r_{XY} \neq r_{YX}$. (b) $r_{XY} \geq r_{YX}$.
(c) $r_{XY} = r_{YX}$. (d) $r_{XY} \leq r_{YX}$.
6. When there are two statistically independent events A and B which of the following holds true ?
- (a) $P(AB) = P(A)P(B/A)$. (b) $P(AB) = P(B)P(B/A)$.
(c) $P(AB) = P(B)P(A/B)$. (d) $P(AB) = P(A)P(B/A)$.
7. The value of $\int_{-1}^1 dx$ is :
- (a) 0. (b) -1.
(c) 2. (d) -2.
8. The elasticity co-efficient given the demand function, $Q = 10 - 2P$ at the point $P = 3$ is :
- (a) -1. (b) -1.5.
(c) -2. (d) 1.
9. When X and Y are independent random variables, the variance of $[\alpha X + \beta Y]$ where α and β are constants, is :
- (a) $\alpha \text{Var}(X)^2 + \beta \text{Var}(Y)^2$. (b) $\alpha \text{Var}(X) + \beta \text{Var}(Y)$.
(c) $\alpha^2 \text{Var}(X) + \beta^2 \text{Var}(Y)$. (d) $\alpha \text{Var}(X) - \beta \text{Var}(Y)$.
10. The value of multiple correlation coefficient, R is always :
- (a) Positive or Negative. (b) Positive.
(c) Negative. (d) Zero.

(10 × 1 = 10 marks)

Part B

Answer eight questions.
Each question carries 5 marks.

11. Find the inverse of $\begin{bmatrix} -1 & 2 & 3 \\ -2 & 4 & 2 \\ 1 & -1 & 3 \end{bmatrix}$.

12. Express the second order differential of $Z = f(x, y)$ in matrix form.

13. Find the elasticity of output with respect to two variable inputs, x_1 and x_2 given the production function, $q = \alpha x_1 + \beta x_2$.

14. Find $\int x e^{x^2} dx$.

15. Obtain the maximum and minimum values of the function, $y = x + \frac{1}{x}$.

16. Given the regression equation of consumption on income as $C = 200 + 0.75 Y$, interpret the parameters and its implication on investment multiplier.

17. Explain binomial distribution.

18. State and explain the properties of determinants of a matrix.

19. Obtain the second order total differential of $U = \alpha x^2 + \beta y^2 + \delta xy$.

20. What is rank of a matrix? Find the rank of $A = \begin{bmatrix} -5 & 4 & 3 \\ 2 & 0 & -1 \\ 10 & -8 & -6 \end{bmatrix}$.

21. Express the following systems of equations in matrix form :

$$2x - y + z = 5$$

$$x + 3y - 2z = 10$$

$$-4x + 5y + z = 1.$$

22. What is mathematical expectation? Explain.

(8 × 5 = 40 marks)

Part C

*Answer any two questions.
Each question carries 15 marks.*

23. The demand and supply functions of a product are respectively given by $P = 25 - 3Q_d$ and $P = -10 + 2Q_s$. Find the consumer's surplus and producer's surplus when the market is in equilibrium.
24. Obtain the optimal value of the function $Z = xy + 2x$ subject to the constraint $20 - x - 2y = 0$ using Lagrange multiplier method.
25. Explain characteristics of probability distribution by stating their properties.
26. Solve the following system of equations using Cramer's rule :—

$$4x + 3y + 4z = 10$$

$$2x + 5y + 2z = 12$$

$$5x + 2y - z = 15.$$

(2 × 15 = 30 marks)