D 73079 (Pages : 4) Name.....

Reg. No.....

FIRST SEMESTER M.A. DEGREE EXAMINATION, DECEMBER 2014

(CUCSS)

Economics

ECO 1C 03—QUANTITATIVE TECHNIQUES – I

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*

Each bunch of **four** *questions carries a weightage* 1.

(A) Multiple choices :

1 If $A^2 = A$, then the matrix A is called :

(a) Nil potent. (b) Idempotent.

(c) Symmetric. (d) Skew symmetric.

2 The value of the determinant $\begin{vmatrix} 0 & 1 & 1 \\ 1 & 1 & 4 \\ 1 & 4 & 9 \end{vmatrix}$ is :

(a) 1. (b) – 1.

(c) 2. (d) – 2.

3 The rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 2 & 2 \end{bmatrix}$ is :

(a) 0. (b) 1.

(c) 2. (d) 3.

4 The roots of the equation $|A - \lambda I| = 0$ are called :

(a) Characteristic vectors of A.

(b) Characteristic roots of A.

(c) Characteristic polynomial of A.

(d) None of these.

(B) Multiple choices :

5 $\frac{d}{dx}(\log x)$ is :

(a) x. (b) x^2.

(c) $\frac{1}{x}$. (d) $\frac{1}{x^2}$.

Turn over

6 Let $x = 100 + 10k - k^2$ be a production function where k represents the capital. Then the marginal productivity when capital is 2 :

(a) 0. (b) 2.

(c) 4. (d) 6.

7 The curve joining all commodity combinations giving the consumer the same level of satisfaction is called :

(a) Demand curve. (b) Supply curve.

(c) Indifference curve. (d) None of these.

8 The marginal revenue for 10 units sold from the total revenue function $R = 100x - x^2$ is given by :

(a) 60. (b) 80.

(c) 100. (d) 120.

(C) Fill in the blanks :

9 Two coins are tossed, then the prob. of getting both heads is ————.

10 The set of all possible outcomes from an experiment is called ————.

11 A card is drawn at random from an ordinary pack of 52 cards, then the probability that the card drawn is either spade or the diamond is ————.

12 If $P(A) = \frac{1}{3}, P(B) = \frac{1}{14}$ and $P(A \cap B) = \frac{1}{42}$, then $P(A \cup B) =$ ————.

(D) State True *or* False :

13 If a card is drawn from a pack of cards, the probability of getting either a King *or* Queen is $\frac{2}{13}$.

14 An event whose occurrence is inevitable is called an impossible event.

15 If A, B, C are mutually exclusive and exhaustive events and $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}P(C)$, then $P(A) = \frac{1}{6}$.

16 Let X be a random variable and 'x' be any value of it, then $F(x) = P(X \leq x)$ is called the probability density function.

(16 × ¼ = 4 weightage)

Part B

Answer any **ten** *not exceeding* **one page** *each.*

Short Answer Questions :

17 Solve using Cramer's rule :

$$3x+3y-z=11$$
$$2x-y+2z=9$$
$$4x+3y+2z=25.$$

18 If $A=\begin{bmatrix}-1 & -2 & -2\\ 2 & 1 & -2\\ 3 & -2 & 1\end{bmatrix}$, show that Adj A = $3A^T$.

19 What are indifferent curves ? What are its properties ?

20 If $A=\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix}$, find A^{-1}.

21 Find the eigen values of the matrix $\begin{bmatrix}2 & 2 & 1\\ 1 & 3 & 1\\ 1 & 2 & 2\end{bmatrix}$.

22 Determine the maxima and minima of $4x^3+9x^2-12x+13$.

23 State and prove the multiplication theorem of probability.

24 State Bayes theorem. Among applicants to a post 60% are males and the rest are females. While 60% of the male applicants are graduates, only 50% of the female applicants are graduates. If a graduate is selected to the post, what is the probability that the selected candidate is a male ?

25 Define a random variable. Are any of the following probability mass or density functions ? Prove your answer in each case :

(a) $f(x)=x\,;x=\frac{1}{16},\frac{3}{16},\frac{1}{4},\frac{1}{2}$.

(b) $f(x)=\lambda e^{-\lambda x}\,;x\geq 0,\lambda>0.$

26 Define mathematical expectation. A player is to toss three coins. He wins Rs. 10 if 3 heads appear, Rs. 5 if two heads appear, Rs. 1 if one head appears. He will lose Rs. 12 if no head appears. What is the expected amount ?

27 X is a random variable such that $f(x) = 2x$; for $0 < x < 1$ and $f(x) = 0$, otherwise, find its first two raw-moments. Also obtain its mean and variance.

28 If the production is given as a function of labour, by $X = 10\ L + 15\ L^2 - 3\ L^3$, where L is the labour. Find the marginal productivity and average product.

(10 × 3.2 = 32 weightage)