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

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

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

6 Let $x = 100 + 10k - k^2$ be a production function where k represents the capital. T

   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 lev

   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

   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 proba

       that the card drawn is either spade or the diamond is ————.

   12 If $P(A) = \dfrac{1}{3}, P(B) = \dfrac{1}{14}$ and $P(A \cap B) = \dfrac{1}{42}$, 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 Ki

       Queen is $\dfrac{2}{13}$.

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

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

       then $P(A) = \dfrac{1}{6}$.

   16 Let X be a random variable and 'x' be any value of it, then $F(x) = P(X \le x)$ is

       the probability density function.

                                                    $(16 \times \frac{1}{4} = 4$ weig

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

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

Turn over

26 Define mathematical expectation. A player is to toss three coins. He wins Rs. 10 heads appear, Rs. 5 if two heads appear, Rs. 1 if one head appears. He will lose Rs 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, its first two raw-moments. Also obtain its mean and variance.

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

$(10 \times 3.2 = 32$ weight