2031

M.A. (Economics)-1st Semester

MAECO-103: Quantitative Methods-I

Time allowed: 3 Hours   Max. Marks: 80

NOTE: *Attempt __five__ questions in all, including Question No. I which is compulsory and selecting __one__ question from each Unit.*

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I.   Answer *any ten* of the following: -

(a)   Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$

(b)   What do you mean by consistent and inconsistent equations?

(c)   Find $\dfrac{dy}{dx}$ when $y = x^5(2x^2 + 1)$

(d)   For the supply function: $x + 5 + 2p^2$, find elasticity of supply at p=2.

(e)   Define homogenous function.

(f)   Distinguish between simple and compound annual growth rates.

(g)   Find out and interpret coefficient of determination when r=0.8

(h)   Explain additional theorem with example.

(i)   Explain any two properties of moment generating function.

(j)   A fair coin is tossed thrice. Find the probability of getting at most 2 heads.

(k) $r_{23} = 0.8$, $r_{13} = 0.5$, $r_{12} = 0.6$. *Find* $r_{12.3}$

(l)   What is value index number?

(m)   Explain ratio to moving average method.

(n)   An unbiased dice is tossed. Obtain the probability distribution of the number on the dice.

(o)   Explain any two problems in the construction of index numbers.   (10×2)

P.T.O.

UNIT – I

II. (a) Given the following function: $q = \left[aL^{-\beta} + bK^{-\beta} \right]^{\frac{-1}{\beta}}$

Where a and b are constants, q is output, L is labour & K is capital:

(i) Show that the function is homogenous of degree one.

(ii) Show that it satisfies Euler's theorem.

(b) A demand function is given by $P = \dfrac{50 - x}{5}$. Find MR function for any output. Also find MR when x=0 and x=5. (10+5)

III. (a) Find $\dfrac{dy}{dx}$ when $x = \dfrac{3at}{1+t^3}$ and $y = \dfrac{3at^2}{1+t^3}$.

(b) Find the optimum values of q_1 and q_2 when $V = q_1^{15}.q_2$ and budget constraint is $3q_1 + 4q_2 = 100$. (8+7)

UNIT – II

IV. (a) The population of a country in 1994 and 2004 was 55 and 67.05 crore respectively. Find the annual compound Annual Rate of Growth (ARG) & simple growth rate.

(b) A machine costs a company Rs. 10,000 and its expected life is 5 years. Alternatively, the machine can be obtained on lease on an annual rent of Rs. 2500. If rate of interest is 12%p.a. Find which alternative is preferable to company? (7+8)

V. (a) Solve the following system of equations by Gauss Elimination Method:

$x - 2y + 3z = 1$

$3x - y + 4z = 3$

$4x + y - 2z = -1$

Also solve the equations by matrix inverse method. Do you get the same answer? Why or why not? Explain.

(b) Show that the vectors, $V = (5,7,11)$, $V_2 = (2,1,13)$ and $V_3 = (3,6,8)$ are linearly dependent. (10+5)

UNIT-III

VI. (a) The table shows the corresponding values of three variables x_1, x_2 and x_3. Find the least square regression of x_3 on x_1 and x_2. Estimate x_3 when $x_1 = 10$ and $x_2 = 6$.

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

(b) What is adjusted R^2? (10+5)

VII. (a) The price (in Rs) of a commodity during 2005-2010 is given below. Fit a parabola $Y = a + bX + CX^2 + 0$ this data. Estimate the price of commodity for the year 2013:

Year	Price	Year	Price
2005	100	2008	140
2006	107	2009	181
2008	128	2010	192

(b) Explain the components of Time Series Analysis. (10+5)

UNIT-IV

VIII. (a) Show that with the help of following data the time and factor reversal tests are satisfied by Fisher's ideal formula for index number construction:

Commodity	Base Year Price (Rs.)	Base Year Quantity (Kg.)	Current Year Price (Rs.)	Current Year Quantity (Kg.)
A	6	50	10	56
B	2	100	2	120
C	4	60	6	61
D	8.5	30	12	24
E	8	40	16	22

(b) The index A given was started in 2001 and continued upto 2006 in which year another index B was started. Splice the index B into index A so that a continuous series of index number from 2001 upto date may be available.

Year	Index A	Index B	Year	Index A	Index B
2001	100		2006	138	
2002	110		2007	150	100
2003	112		2008		120
-			2009		140
-			2010		130

(7+8)

IX. (a) A bag contains 8 red and 5 white balls. Two successive drawings of 3 balls are made such that: (i) balls are replaced before the second trial (ii) the balls are not replaced before the second triad. Find the probability that the first drawing will give 3 white and second 3 red balls.

(b) A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000 and 2000 units respectively. According to past experience, it is known that the fractions of defective output produced by three plants are respectively at random 0.005, 0.008 and 0.0010. Of a piper is selected from a day's total production and found to be defective, find out (i) from which plant for this defective pipe, the probability is highest (ii) what is the probability that it came from the first plant? (7+8)

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