

Roll No.

Total No. of Pages : 03

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MBA/MBA(IB) (Sem.-1st)
QUANTITATIVE TECHNIQUES

Subject Code : MB-104 (2008 & onward Batches)

Paper ID : [C0167]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY.
2. Attempt any FOUR questions from SECTION-B.

SECTION-A (10 × 2 = 20 Marks)

1. (a) Discuss the use of Regression Analysis in Business Management.
(b) Using Principle of Mathematical Induction, check that
$$2 + 6 + 10 + 14 + \dots + 2(2n-1) = 2n^2 + 1; n \in \mathbb{N}.$$

(c) Discuss Trend Method in Time Series Analysis.
(d) If $A = \begin{bmatrix} x & 4 \\ y & 2 \end{bmatrix}$, $B = \begin{bmatrix} -y & 2 \\ x & 3 \end{bmatrix}$ and $A + 2B = \begin{bmatrix} 2 & 8 \\ 9 & 8 \end{bmatrix}$, find x and y .
(e) List the relevance of selecting Base Period in Index Numbers.
(f) A & B are 2 independent events. The probabilities that both occur simultaneously is $1/6$ and the probability that neither occurs is $1/3$. Find the probabilities of occurrence of A & B respectively.
(g) Discuss utility of Spearman's Rank Correlation method.
(h) Discuss Significance Level and Degrees of Freedom in Hypothesis Testing.
(i) In a series of 5 observations, the values of mean and variance are 4.4 and 8.24 respectively. If three observations are 1, 2 and 6, find the other two observations.
(j) What are the different errors in Hypothesis Testing?

SECTION-B

(4 × 10 = 40 Marks)

2. The prices (in Rs) of three commodities X, Y and Z are x, y and z respectively. A purchases 4 units of Z and sells 3 units of X and 5 units of Y. B purchases 3 units of Y and sells 2 units of X and 1 unit of Z, C purchases 1 unit of X and sells 4 units of Y and 6 units of Z. In the process A, B and C earn Rs 6000, Rs 5000 and Rs 13000 respectively. Using matrices, find the prices per unit of the three commodities.
3. By Mathematical Induction principle, prove that $\frac{2n!}{2^{2n}(n!)^2} \leq \frac{1}{(3n+1)^{1/2}}$ for all positive integers n.
4. Construct the consumer price index number for 2010 on the basis of data of 2000 from the following data using:
 - (a) Family Budget Method
 - (b) Aggregative Expenditure Method

Commodity	Rice	Wheat	Pulses	Ghee	Oil
Weights	40	20	15	20	5
Price (per Unit) In 2000 (Rs)	16.00	40.00	0.50	5.12	2.00
Price (per Unit) In 2010 (Rs)	20.00	60.00	0.50	6.25	1.50

5. The data in the following table relates to the weekly maintenance cost (in Rs) to the age (in months) of 10 machines in a company. Using regression analysis, estimate the maintenance cost for a machine which is 72 months old.

Machine	1	2	3	4	5	6	7	8	9	10
Age (Months)	5	10	15	20	30	30	30	50	50	60
Cost (Rs)	190	240	250	300	310	335	300	300	350	395

6. In order to test whether declaration of dividends has had any effect on the market price of shares of companies, a random sample of 8 companies was taken, from companies which have declared at least 15% dividends. The data regarding the share prices of the sample companies is given as below.

	1	2	3	4	5	6	7	8
Market Price 10 days before dividends were declared	70	65	112	58	25	147	95	68
Market Price 10 days after dividends were declared	80	85	110	64	32	159	100	70

Can we say that the increase in the average market price after declaration of dividends is significant (at 5% significance level)?

7. A progressive farmer uses 3 types of fertilizers on 4 different fields. The yield figures per field are given below.

	Yield				TOTAL
Fertilizers	Field A	Field B	Field C	Field D	
Nitrogen	6	4	8	6	24
Potash	7	6	6	9	28
Phosphates	8	5	10	9	32
TOTAL	21	15	24	24	84

Test whether the 4 fields are materially different in fertility ? Also find out whether the three different fertilizers make any material difference in the yields?