Paper ID [MB104]

(Please fill this Paper ID in OMR Sheet)

MBA (Sem. - 1st)

QUANTITATIVE TECHNIQUES (MB - 104)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **Compulsory**.

2) Attempt any **Four** questions from Section - B.

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Section - A   *(10 × 2 = 20)*

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Q1) a) Are the following sets equal A = {$x : x$ is a letter in the word 'LOYAL'} and B = {$x : x$ is a letter in the word 'ALLOY'}? Justify?

b) If $\log_{10} y = x$, find the value of 10^{2x} in terms of y.

c) Without expansion prove that $xyz = 1$,

$$\text{if} \begin{vmatrix} x & x^2 & 1+x^2 \\ y & y^2 & 1+y^2 \\ z & z^2 & 1+z^2 \end{vmatrix} = 0 \text{ (Also } x \neq y \neq z).$$

d) Using binomial theorem, compute the value of $(99)^4$.

e) If $\bar{x}_1 = 50, \bar{x}_2 = 27, n_1 = 9, n_2 = 5$, find the combined mean.

f) Write a note on kurtosis of distribution.

g) Find the chance of a non leap year having 53 Wednesday.

h) If in a Poisson distribution $P(1) = P(2)$, find value of $P(4)$.

i) Write conditions for the application of χ^2 test.

j) Define probable error of coefficient of correlation.

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Section - B   *(4 × 10 = 40)*

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Q2) (a) The present population of a country is 9261000. If it has been increasing at the rate of 3% annually, using *log* tables find the population 3 years ago.

(b) Prove by mathematical induction that $n < 2^n$, for all $n \in N$.

Q3) (a) Product of first three terms of a G.P. is 1000. If 6 is added to its second term and 7 added to its third term, it becomes an A.P. Find the G.P.

(b) Scores obtained by two batsmen in 10 matches are as follows:

| A | 30 | 44 | 66 | 62 | 60 | 34 | 80 | 46 | 20 | 38 |
| B | 34 | 46 | 70 | 38 | 55 | 48 | 60 | 34 | 45 | 30 |

Determine who is the most consistent batsman.

Q4) (a) Find the coefficient of correlation between industrial production and export using the following data:

| Production | 55 | 56 | 58 | 59 | 60 | 60 | 62 |
| Export | 35 | 38 | 38 | 39 | 44 | 43 | 44 |

(b) If θ is the angle between two regression lines, then show that

$$\tan\theta = \frac{1-r^2}{r}\frac{\sigma_x\sigma_y}{\sigma_x^2+\sigma_y^2}$$

Explain the significance of the formula when $r=0$, $r=1$.

Q5) (a) Fit a straight line trend by least squares method to the following data and calculate short time fluctuations:

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Production('000 tons) | 75 | 83 | 109 | 129 | 134 | 148 |

(b) The average whole sale price in rupees per 20 seers of wheat sold in U.P. is given below. Using 1956 as base year find the price relatives (simple index numbers) corresponding to all the years

| Year | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 |
| Price | 14.95 | 14.94 | 15.10 | 15.65 | 16.28 | 16.53 |

Q6) (a) A and B throw alternately with a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, find his chances of winning.

(b) The marks obtained in a certain examination are found to be normally distributed. If 12.5% of the candidates obtain 60% or more marks, 39% obtain less than 30 marks, find the mean number of marks obtained by candidates. (Given that for A=0.125, x/σ=1.15 and for A=0.61, x/σ=0.279)

Q7) (a) If T is an unbiased estimator of θ, show that T^2 and $\sqrt{T}$ are the unbiased estimators of θ^2 and $\sqrt{\theta}$ respectively.

(b) 9 items of a sample has the following values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these items differ significantly from assumed mean of 47.5. (Given that for v=8, P=0.945 for t=1.8 and P=0.953 for t=1.9)

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