

# THE INSTITUTE OF CHARTERED ACCOUNTANTS OF PAKISTAN

Foundation Examinations Autumn 2008



September 2, 2008

## QUANTITATIVE METHODS

(MARKS 100)

### Module A

(3 hours)

- Q.1 (a) Find the value of  $x$  in the given equation:  
 $8^{2x-4} = 16^x$  (03)
- (b) A gardener has been given the task of digging an area of 800 square meters. It is expected that he will dig 10 square meters on the first day and on each successive day he will dig 1.2 times more than the area he dug on the previous day. Find the number of days the gardener will take to complete the task. (05)
- Q.2 (a) The number of fishes in a lake is expected to increase at a rate of 8% per year. How many fishes will be in the lake in 5 years if 10,000 fishes are placed in the lake today? (03)
- (b) Shahab has the opportunity to invest in a fund which earns 6% profit compounded annually. How much should he invest now if he wants to receive Rs. 6,000 (including principal) from the fund, at the end of each year for the next 10 years? How much interest he would earn over the period of 10 years? (06)
- Q.3 (a) The average price of an item 'R' is directly related to the quantity ordered. The average price is Rs. 35 when 250 items are ordered and Rs. 55 if only 50 items are ordered. Identify the linear price function and calculate the price per item if a quantity of 115 is ordered. (04)
- (b) A bank has provided two options to an investor:
- 11.1% profit compounded semi-annually.
  - 11.0% profit compounded monthly.
- Which option would you recommend? (03)
- Q.4 (a) The demand function of an item is;  $P(x) = 100 - 0.01x$ .  
Its cost function is;  $C(x) = 50x + 10,000$ .  
Determine the maximum profit that can be earned in the above situation and the price at which the profit will maximise. (07)
- (b) If  $y = (x^2 - 1)^4 (x^2 + 1)^5$ ; show that  $\frac{dy}{dx} = 2x(x^2 - 1)^3 (x^2 + 1)^4 (9x^2 - 1)$  (05)

- Q.5 (a) Sketch the feasible region and identify the redundant constraint from the following set of inequalities:

$$x + y \leq 6$$

$$5x + 3y \leq 15$$

$$x \leq 2$$

$$x, y \geq 0$$

(05)

- (b) Solve the following system of equations by matrix **inversion** method:

$$2x - y + 3z = 7$$

$$x + 3y - z = 8$$

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

(09)

- Q.6 (a) Following are the ages of nine employees of an insurance company:

47, 28, 39, 51, 33, 37, 59, 24, 33

(i) Find the values of the first and the third quartile.

(ii) Calculate the quartile deviation.

(03)

- (b) The mean annual salary of all employees in a company is Rs. 150,000. The mean annual salary of male and female employees is Rs. 162,000 and Rs. 102,000 respectively. Find the percentage of male and female employees in the company.

(05)

- Q.7 (a) If two fair dice are rolled together, which of the following is more likely:

- Getting a total of 7 or more.
- Getting a total of 7 or less.

(05)

- (b) In a group of 12 international referees, there are three from Africa, four from Asia and five from Europe. To officiate at a tournament, three referees are chosen at random from the group. Find the probability that:

(i) A referee is chosen from each Continent.

(ii) Two referees are chosen from Asia.

(iii) All the three referees are chosen from the same Continent.

(07)

- Q.8 The data in the following table shows the monthly maintenance cost and the ages of nine similar machines operating in a factory:

Machine	1	2	3	4	5	6	7	8	9
Age (in months)	5	10	15	20	30	30	30	50	50
Cost (Rs in 000)	19	24	25	30	31	32	30	30	35

- (a) Find the least square regression line of maintenance cost on age. (06)
- (b) Describe the apparent relationship between maintenance cost and age. (01)
- (c) Find the coefficient of correlation and interpret your result. (04)

- Q.9 (a) Sixteen cars of a specific model were selected at random. A test of fuel consumption gave a mean of 26.4 kilometer (km) per liter, with a standard deviation of 2.3 km per liter.

Assuming that the km per liter given by all cars of that model has a normal distribution, find a 99% confidence interval for population mean. Interpret your result. (05)

- (b) Compute Laspeyre's Price Index for the following data using 2002 as base:

Commodities	Price in 2002	Price in 2007	Quantity in 2002
A	140	220	40
B	120	180	25
C	80	110	60

(04)

- Q.10 (a) An advertising company wants to estimate with 97.5% confidence, the number of times a website is hit during an hour. It has determined that  $\sigma = 26$ .

How large a sample should the company take, if it wishes that the margin of error should not exceed 10? (04)

- (b) The life (in months) of a hair dryer is approximately normally distributed with mean 96 and a standard deviation of 18. You are required to determine the following:

- (i) What percentage of the units sold will have to be replaced if the warranty period is five years?  
(ii) The maximum warranty period if the manufacturer wants to limit the replacement to 1% of the units sold. (06)

(THE END)