THE INSTITUTE OF CHARTERED ACCOUNTANTS OF PAKISTAN

Foundation Examinations   Spring 2008

March 4, 2008

QUANTITATIVE METHODS
Module A

(MARKS 100)
(3 hours)

Q.1   (a)   Find the values of x and y in the given set of simultaneous equations:

$$\frac{x+1}{y+1} = \frac{4}{5} \qquad \text{and} \qquad \frac{x-5}{y-5} = \frac{1}{2}$$

(05)

   (b)   Find the equation of a straight line which intersects the *y*-axis at *y* = 4 and the *x*–axis at *x* = 8.   **(04)**

Q.2   (a)   Using log 2 = 0.3010, log 3 = 0.4771 and log 5 = 0.6990, find the values of:

   (i)   Log 4.5
   (ii) $Log\ 2\sqrt{5}$ **(04)**

   (b)   If $y = \sqrt{\ln 2x + e^{2x}}$ show that $\frac{dy}{dx} = \frac{1+2xe^{2x}}{2xy}$ **(04)**

Q.3   (a)   How much should an individual deposit now to yield Rs. 600,000 at the end of five years in each of the following situations:

   (i) At 10% simple interest
   (ii) At 9% compounded half yearly   **(05)**

   (b)   Ashraf purchased a new car and made a down payment of Rs. 50,000. He is further required to pay Rs. 30,000 at the end of each quarter for five years. You are required to:

   (i)   Find the cash purchase price of the car, if the quarterly payments include 12% interest per annum compounded quarterly.
   (ii)   Find the total amount of interest Ashraf has to pay.   **(05)**

Q.4   (a)   The revenue function for a product is:

$TR = 400q - 2q^2$
The average cost function is:
$AC = 0.2q + 4 + \frac{400}{q}$, where q is the number of units

Determine the following:
   (i)   Level of output at which profit is maximized.
   (ii)   Price at which maximum profit occurs.
   (iii)   Amount of maximum profit.   **(07)**

(b) For the following set of inequalities:

$$x + 2y \le 8, \qquad 3x + y \le 12$$
$$x + y \le 5, \qquad x \ge 0, \ y \ge 0$$

Draw the graph and highlight the feasible region clearly indicating its boundaries. **(07)**

Q.5 Solve the following system of equations by Cramer's Rule:

$$2x + 8y + 5z = 5$$
$$x + y + z = -2$$
$$x + 2y - z = 2$$

(09)

Q.6 (a) Your Statistics teacher has given you an assignment to select ten students currently enrolled at your college and collect data for the following variables:

X = Age of the students.
Y = Number of family members.

You are required to answer the following:

(i) What is the population in the given scenario?
(ii) Is the population finite or infinite? Give brief reason to support your answer.
(iii) Classify the variables X and Y as discrete or continuous. **(03)**

(b) The following stem-and-leaf display shows the number of units produced per day:

```
 3 | 8
 4 | -
 5 | 6
 6 | 0 1 3 3 5 5 9
 7 | 0 2 3 6 7 7 8
 8 | 5 9
 9 | 0 0 1 5 6
10 | 3 6
```

Observe the above data and answer the following:

(i) For how many days, the data was collected?
(ii) What are the smallest and the largest values?
(iii) How many values are 80 or more?
(iv) List the actual values in second and fourth row.
(v) What is the middle value? **(05)**

(c) A binomial random variable has a mean of 200 and a standard deviation of 10. Find the values of n and p. **(04)**

Q.7 (a) The two regression lines obtained in a correlation analysis are:
$5x = 6y + 24$ and $1000y = 768x - 3708$
Determine b_{xy}; b_{yx} and the correlation coefficient '**r**'. **(04)**

(b) Students who finish the examinations more quickly than the rest are often thought to be smarter. The following set of data shows the score of 12 students and the order in which they finished their examination:

Order of finish	1	2	3	4	5	6	7	8	9	10	11	12
Exam score	90	78	76	60	92	86	74	60	60	78	68	64

Find the Spearman's rank correlation co-efficient for the above data. **(07)**

Q.8 (a) Consider the following frequency distribution:

Class Interval	10–19	20–29	30–39	40–49	50–59
Frequency	10	14	24	15	9

Find the mean, variance and standard deviation. **(05)**

(b) The per capita income in a country has increased from $ 450 in the year 2000 to $ 960 in the year 2007. Taking base as 100 in the year 2000, the Consumer Price Index in 2007 stood at 160. Compute the real per capita income and the purchasing power of money, in the year 2007. **(02)**

Q.9 (a) A husband and wife were interviewed for two different posts in the same organization. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. What is the probability that:

(i) Both of them will be selected.
(ii) None of them will be selected.
(iii) Only one of them will be selected. **(04)**

(b) A fair dice is rolled thrice. What is the probability that each time a six will appear. **(02)**

Q.10 (a) The following data were obtained from an experiment designed to estimate the reduction in blood pressure as a result of following a salt free diet for two weeks:

Before	93	106	87	92	102	95	88	110
After	92	102	89	92	101	96	88	105

Assuming that the blood pressures of the population are normally distributed, find the 98% confidence interval for the mean reduction in blood pressure. **(07)**

(b) A random sample of size 16 has a mean of 53. The sum of squares of deviations of values from the mean is 150. Assuming the population values are approximately normally distributed, test the hypothesis that population mean is 56. (Take $\alpha = 0.05$) **(07)**

(THE END)