

THE INSTITUTE OF CHARTERED ACCOUNTANTS OF PAKISTAN

Foundation Examinations Spring 2009



March 3, 2009

QUANTITATIVE METHODS

(MARKS 100)

Module A

(3 hours)

- Q.1 (a) If $\log xy = 0.9$ and $\log x/y = 0.5$, find the following, without using a calculator/table:
- (i) $\log x^2$
 - (ii) $\log \sqrt{y}$ (03)

- (b) Factorize the following expression to its simplest form:
 $ax^2 - ay^2 + bx^2 - by^2$ (02)

- Q.2 (a) Ali walked a certain distance on the first of February 2009. On each successive day he walked 100 meters more than the previous day. If the total distance covered by him in 28 days is 51.8 km, find the distance covered by him on:
- (i) the first day
 - (ii) the last day (04)

- (b) Asif works in a factory where wages are paid on weekly basis. The overtime rate is higher than the normal rate. In addition, the overtime in excess of eight hours per week is paid at a rate which is double the rate applicable to the first eight hours of overtime. The related data is as follows:

	Normal Hours	Overtime Hours	Pay Received (Rs.)
1 st week of Feb' 09	45	10	1,200
2 nd week of Feb' 09	40	15	1,350

Find the normal and overtime rates per hour. (05)

- Q.3 (a) A company is considering a project which requires an investment of Rs. 1,200,000 now and Rs. 300,000 at the end of the 1st year. It will earn Rs. 200,000 at the end of 2nd year and thereafter it will earn a fixed annual amount up to the 7th year.
- If interest rate is 11%, find the amount that the project should earn annually i.e. from year 3 to year 7 if the company desires to earn a net present value of Rs. 100,000. (07)

- (b) Younus Limited (YL) has borrowed an amount of Rs. 100,000 at an interest of 10% per annum compounded semi-annually. To pay off the loan at the end of four years, YL has created a sinking fund, which yields a return of 8% per annum compounded quarterly. Determine the amount which YL must deposit at the end of each quarter, in the sinking fund, to settle the loan at the end of four years? (05)

- Q.4 (a) If $y = xe^x \log x$, show that:
- $$\frac{dy}{dx} = y + e^x(1 + \log x)$$
- (05)

(2)

(b) The cost of manufacturing x units of an item consists of the following:

- Material : Rs. 2 per unit
Labour: Rs. $x^2/90$ per unit
Overheads: Rs. 1000

Determine the number of units that should be produced in order to minimize the average cost. (06)

Q.5 (a) Find the value of K , if:

$$A = \begin{bmatrix} 0 & 3 \\ -2 & 5 \end{bmatrix} \text{ and}$$

$KA^2 = 5A - 6I$, where I is an identity matrix of order 2. (05)

(b) A furniture firm makes chairs and tables on three machines M1, M2 and M3. The detail of number of hours required per unit and total hours available on each machine is as follows:

Machine	Time in hours		
	Chair	Table	Available time
M1	3	3	36
M2	5	2	50
M3	2	6	60

Draw the graph of linear inequalities and indicate the feasible region by proper shading. (08)

Q.6 (a) The mean and standard deviation of a sample of 100 observations were found to be 104 and 4.7 respectively. Later, error was detected in three records as enumerated below:

S. No.	Correct Figure (as per original record)	Amount Taken (for computation)
58	151	115
72	78	87
89	98	89

Find the correct mean and standard deviation. (05)

(b) Consider the following Stem-and-leaf display:

4	2	3													
4	6	7	8	9	9										
5	0	1	1	1	1	1	2	2	4	4	4	4	4	4	
5	5	5	5	5	6	6	6	7	7	7	7	8	8	8	
6	0	1	1	1	2	4	4								
6	5	8	9												

(i) For the data given above, determine:

- Minimum value
- Maximum value
- Median
- First quartile
- Third quartile

(04)

(ii) Make a Box and Whisker plot for the given data. (02)

- Q.7 A company wants to assess the impact of advertising expenditures on its annual profit. The following table presents the information for eight years:

Year	Rupees in millions	
	Advertising expenditure	Annual profit
2001	90	45
2002	100	42
2003	95	44
2004	110	60
2005	130	30
2006	145	34
2007	150	35
2008	140	30

- (a) Construct the least square regression equation and predict the annual profit for the year 2009 if the advertising expenditure is budgeted at Rs. 160 million. (07)
- (b) Determine the coefficient of correlation and interpret your result. (04)
- Q.8 (a) A dice is rolled twice. What is the probability that the number appearing in the first throw is greater than the number appearing in the later attempt? (03)
- (b) An industrial product is shipped in lots of 20. A sample of five units is selected by the buyer for inspection. The buyer rejects the lot if more than one defective item is observed in the sample. If a lot contains four defective items what is the probability that it would be accepted? (05)
- (c) People of Greenland have a mean height of 160 cm with a standard deviation of 15 cm. If a random sample of size 40 is taken, what is the probability that the sample mean height shall lie between 157 cm and 165 cm? (06)
- Q.9 (a) An auditor claims that 10% of the customers' ledger accounts contain mistakes. A random sample of 600 accounts was taken to test the accuracy of ledger accounts and mistakes were detected in 45 accounts. Using 5% level of significance, explain whether the sample result is consistent with the auditor's claim. (07)
- (b) The city government has conducted a survey for assessing the inclination of citizens towards installing backup power arrangements in their homes. It has collected the following data:

	Owners	Tenants	Total
Generator only	220	200	420
UPS only	160	170	330
Generator + UPS	140	110	250
No backup	180	220	400
Total	700	700	1,400

Using chi-square test at 5% level of significance, assess the hypothesis that installation of backup power arrangements is independent of the types of residents i.e. owners or tenants. (07)

(THE END)