



THE INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF BANGLADESH  
CMA JUNE, 2018 EXAMINATION  
FOUNDATION LEVEL  
SUBJECT: 003. QUANTITATIVE TECHNIQUES

Time: Three hours

Full Marks: 100

- ❖ Answer any **TEN** questions, FIVE questions from each part.
- ❖ Answer must be brief, relevant, neat and clean.
- ❖ Use fresh sheet for answering each question.

**PART – A: BUSINESS MATHEMATICS**

**Q. No. 1**

- (a) Let  $U = \{1, 2, 3, \dots, 19, 20\}$  be the universal set and  $A =$  set of all odd integers in  $U$  and  $B =$  set of all prime numbers in  $U$ . Write down the following sets:  
(i)  $A \cup B$ , (ii)  $A \cap B$ , (iii)  $A^c$ , (iv)  $(A \cap B)^c$
- (b) An investment will yield Tk. 10,000.00 per annum for 8 years. If finance can be obtained at 7% per annum and the investment costs Tk. 50,000.00, is it worth undertaking?

[Marks: (5+5) = 10]

**Q. No. 2**

- (a) Solve  $2^x \cdot 3^{2x} = 100$
- (b) The demand and supply equations are  $2p^2 + q^2 = 11$  and  $p + 2q = 7$ . Find the equilibrium price and quantity. Where  $p$  stands for price and  $q$  for quantity.

[Marks: (5+5) = 10]

**Q. No. 3**

- (a) Find the value of 
$$\frac{1}{\log_p(x)} + \frac{1}{\log_q(x)} + \frac{1}{\log_r(x)}$$
- (b) A committee of four is to be chosen from five Science students and three Arts students. In how many ways can this be done so that the committee contains
- (i) at least one Science students
  - (ii) at least one Science and one Arts students.

[Marks: (4+6) = 10]

**Q. No. 4**

- (a) Find for what values of  $x$ , the following expression is maximum and minimum respectively:  
$$15x^4 + 8x^3 - 18x^2$$
  
Find also the maximum and minimum values of the expression.
- (b) If  $\tan A + \sin A = m$  and  $\tan A - \sin A = n$   
prove that  $m^2 - n^2 = 4\sqrt{mn}$

[Marks: (6+4) = 10]

**Q. No. 5**

- (a) In what time will a sum of Tk.1,234.00 amount to Tk.5,678.00 at 8% p.a, compound interest, payable quarterly?
- (b) Compute the inverse of Matrix:

$$\begin{pmatrix} 3 & 1 & 3 \\ 2 & 4 & 2 \\ 1 & 2 & 4 \end{pmatrix}$$

[Marks: (4+6) = 10]

**Q. No. 6**

- (a) If the population of a town increases 25 per thousand per year and the present population is 26,24,000, what will be the population in 3 years' time? What was it a year ago?
- (b) Find  $\frac{dy}{dx}$ , where  $y =$   
 (i)  $\frac{1+\cos x}{\sin x}$ ;                      (ii)  $x^a + a^x + a^a$ .

**[Marks: 5+(2+3) = 10]**

**Q. No. 7**

- (a) (i) Find  $\frac{dy}{dx}$ ,  $x^2 - y^2 + 3x = 5y$   
 (ii) Evaluate  $\int \log x dx$ .
- (b) Marginal revenue function and marginal cost function of a firm are  $R'(x) = 16 - x^2$  and  $C'(x) = 3x^2 - 2x + 8$  respectively. Where  $x$  is the quantity of product and fixed cost of the firm is Tk. 500, then find  
 (i) The total revenue function.  
 (ii) The average revenue function.  
 (iii) The demand function.  
 (iv) The maximum total revenue.

**[Marks: (2+2) + 6 = 10]**

**PART – B: BUSINESS STATISTICS**

**Q. No. 1**

- (a) What is data? How can you arrange data?  
 (b) Distinguish between frequency distribution and relative frequency distribution.  
 (c) The following table gives the weekly wage in US\$ of 50 employees of Beximco Pharmaceuticals Company:

Weekly wage in US\$	Number of employees
58.5-63.5	3
63.5-68.5	6
68.5-73.5	5
73.5-78.5	5
78.5-83.5	6
83.5-88.5	9
88.5-93.5	10
93.5-98.5	6
Total	50

Compute the mean, median and mode wage of the employees.

**[Marks: (2+2+6) = 10]**

**Q. No. 2**

- (a) When median are the best measures of frequency distribution?  
 (b) What is co-efficient of variation?  
 (c) Find the correct co-efficient of variation from the following information:  
 Suppose, the mean and standard deviation of a set of 100 observations were worked out as 40 and 5 respectively by a computer which by mistake took the value 50 in place off 40 for one of the observation. Correct standard deviation is 24. You are to find out correct mean and then co-efficient of variation.

**[Marks: (2+2+6) = 10]**

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**Q. No. 3**

- (a) What is business forecasting? What are the assumptions on which business forecasting are made?  
 (b) "A 12-month moving average of time series data removes trend and cycle." Do you agree? Why or why not?  
 (c) Catalogues listing textbooks were examined to discover the relationship between the cost of a book and number of pages it contains. The perusal gives the following data for ten books.

Pages	350	270	255	312	190	455	305	210	375	200
Cost(Tk.)	135	110	95	120	70	150	115	80	140	75

- (i) Obtain the line of regression for estimating the cost of a book.  
 (ii) What is your estimate of cost for a book containing 500 pages?  
 (iii) What increase would you expect in cost if it is decided to increase the number of pages by 100?

[Marks: (2+2+6) = 10]

**Q. No. 4**

- (a) What do you understand by the term "regression analysis"? Point out the role of regression analysis in business decision making.  
 (b) Find the correlation co-efficient between age and playing habits of the following students.

Ages	12	13	14	15	16	17
No. of students	300	250	200	150	120	100
Regular players	200	150	90	50	40	20

- (i) Identify and comment on the nature of correlation.  
 (ii) Explain with graph and example of (i) Zero correlation (ii) Perfect correlation and (iii) High correlation between above two variables.

[Marks: {2+(5+3)} = 10]

**Q. No. 5**

- (a) What is test of hypothesis? Explain type one error and type two error with table.  
 (b) The nine items of a sample had the following values:

45, 47, 50, 52, 48, 47, 49, 53, 50.

The sample mean is 49 and the sum of squares of deviation taken from mean is 52. Can this sample be regarded as taken from the population having 47 as mean? Also find 95% confidence interval. The table value of 't' for 8 degrees of freedom at 5% level is 2.31.

[Marks: (4+6) = 10]

**Q. No. 6**

- (a) Define different types of probabilities.  
 (b) Explain addition and multiplication law of probabilities.  
 (c) Write short note on: (i) Uniform distribution (ii) Uses of moment (iii) Normal distribution (iv) Lorenz curve (v) Questionnaire and (vi) Time series analysis.

[Marks: (2+2+6) = 10]

**Q. No. 7**

- (a) Explain how statistics is useful in the decision making process of business and management.  
 (b) Distinguish between the f following (**any four**):  
 (i) Sample and Population (ii) Point estimation and interval estimation (iii) Statistic and parameter (iv) Sampling error and non Sampling error (v) Histogram and bar diagram (vi) Skewness and Kurtosis.

[Marks: (2+8) = 10]

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