THE INSTITUTE OF COST AND MANAGEMENT ACCOUNTANTS OF BANGLADESH
CMA JUNE, 2017 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,....., 8, 9} be the universal set and let A = {1, 2, 3, 4} and B= {2, 4, 6, 8}.

Write down the following sets:

(i) AUB, (ii) A∩B, (iii) A^c, (iv) $(A \cap B)^c$

(b) A machine depreciates at the rate of 15% of its value at the beginning of a year. The machine was purchased for Tk.1,00,000 and the scrap value realized when sold was Tk.50,250. Find out the number of years during which the machine was in use.

[Marks: 4+6 = 10]

Q. No. 2

(a) From a group of 8 men and 5 women, five persons are to be selected to form a committee so that at least 2 men are there in the committee. In how many ways can it be done?

(b) Solve the following simultaneous equations graphically and algebraically:

$2x+3y=18$

$7x+5y=35$

[Marks: 5+5 =10]

Q. No. 3

(a) If α, β are the roots of $ax^2+2bx+c= 0$, find the value of $(\alpha+\frac{1}{\alpha})^2+(\beta+\frac{1}{\beta})^2$ in terms of a, b and c.

(b) Find the value of $\sin A(1+\tan A)+\cos A(1+\cot A)$.

[Marks: 6+4 =10]

Q. No. 4

(a) If Ø is positive and an acute angle, find the value of Ø satisfying $\cot^2$ Ø +cosec Ø -5 = 0.

(b) Find $\frac{dy}{dx}$ of the following functions:

(i) $y = (\sin x)^{\cos x}$ (ii) $x^2 – y^2+3x = 5y$

[Marks: 4+(3+3) =10]

Q. No. 5

(a) Find the profit maximizing output for the following revenue and cost functions: $R(x)=2000x-2x^2$; $C(x) = x^3 –59x^2 +1315x + 2000$.

(b) Solve $\log_9 x+3\log_3 x=14$.

[Marks: 6+4 = 10]

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Q. No. 6

(a) Find the inverse of the matrix $A = \begin{pmatrix} 2 & 3 & 4 \\ 1 & 1 & 2 \\ 3 & 2 & 1 \end{pmatrix}$.

(b) Carryout the following integrals: (i) $\int \left(\frac{e^x}{e^{2x}+1} \right) dx$ (ii) $\int x^2 (2x^3+3)^5 dx$

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

Q. No. 7

(a) A man retires at the age of 59 years and his employer gives him a pension of Tk. 1,20,000 a year paid in half yearly installments for the rest of his life. Reckoning his expectation of life after retirement to be 15 years and that interest is at 4% p.a. payable half yearly, what single sum is equivalent to his pension?

(b) What is the present value of Tk. 1000 due in 2 years at 5% p.a. compound interest, according as the interest is paid half-yearly?

[Marks: 6+4 =10]

PART – B: BUSINESS STATISTICS

Q. No. 1

(a) Discuss the role of statistics in business decisions.

(b) Distinguish with example between: (i) Raw data and Primary data, (ii) Population and Sample, (iii) Statistic and Parameter, (iv) Histogram and Bar diagram, (v) Frequency polygon and Ogive.

(c) Define probability, mutually exclusive events and conditional probability.

[Marks: 1+5+4 =10]

Q. No. 2

(a) Give a brief description of different measures of central tendency with their appropriate uses.

(b) The marks in Math of 40 students in class ten of a school are:

54	56	56	59	60	62	62	66	67	68
68	70	70	73	73	73	75	77	52	79
79	81	78	68	63	53	50	56	66	58
59	58	68	60	61	63	60	54	78	68

(i) Construct a frequency distribution table.

(ii) Calculate median and mode of the above distribution.

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

Q. No. 3

(a) Define mean deviation and standard deviation. Why standard deviation is the best measure of dispersion?

(b) Find mean deviation and standard deviation from the following data set:

Monthly wages (in Tk.)	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500
No. of workers	6	10	22	30	16

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

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Q. No. 4.

(a) What do you mean by the terms skewness and kurtosis? Point out their role in analyzing a frequency distribution.

(b) Production rate of two machines in eight consecutive days were given below:

Machine A	20	24	18	24	17	25	28	15
Machine B	22	23	19	13	15	27	18	13

Which machine had more stable production and why?

[Marks: 3+7 =10]

Q. No. 5

(a) Below are given the figures of production (in million tons) of a Cement factory.

Years	1990	1992	1993	1994	1995	1996	1999
Productions(tons)	77	88	94	85	91	98	90

(i) Fit a straight-line trend by the least square method.
(ii) Eliminate the trend. What components of the time series are thus left over?
(iii) What is monthly increase in the production of cement?

(b) Identify the components of a time series model.

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

Q. No. 6

(a) A large chain retailer purchase a certain kind of electronic device from a manufacturer. The manufacturer indicates that the defective rate of the device is 3%. The inspector of the retailer randomly picks 20 items from a shipment. What is the probability that there will be at least one defective item among these 20?

(b) A client has an investment portfolio whose mean value is equal to $500,000 with a standard deviation of $15,000. Determine the probability that the value of her portfolio is between $485,000 and $530,000.

[Marks: 5+5 =10]

Q. No. 7

(a) What is hypothesis? What do we mean when we reject a hypothesis on the basis of a sample?

(b) Distinguish between Type-I and Type-II error.

(c) An internet server claims that its users spend on the average 20 hours per week with a standard deviation of 3 hours on the information superhighway. To determine whether this is an overestimate, a competitor conducted a sample survey of 15 customers and found that the average time spent online was 22 hours per week. Do the data provide sufficient evidence to indicate that the average hours of use are less than that claimed by the first internet? Test at 5% level of significance.

[Marks: 2+2+6 =10]

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