Time: Three hours   Full Marks: 100

- ❖ Answer **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) Dhaka city has a total population 2,00,00,000. Out of it 1,20,00,000 are service holder and 60,00,000 are businessmen while 10,00,000 are in both positions. Indicate how many people are neither service holders nor businessmen.

(b) Each student in a class of 40 plays at least one indoor game chess, carrom and scrabble. 18 play chess, 20 play scrabble and 27 play carrom. 7 play chess and scrabble, 12 play scrabble and carrom and 4 play chess, carrom and scrabble.

Find the number of students who play (i) chess and carrom. (ii) chess, carrom but not scrabble.

[Marks: (5+5) = 10]

Q. No. 2

(a) If α, β are the roots of the equation $7x^2 – 5x – 3 = 0$. Form the equation which have the roots $\frac{1}{\alpha} + \frac{3}{\beta}, \frac{3}{\alpha} + \frac{1}{\beta}$.

(b) How many arrangements can be made with the letters of the word MATHEMATICS and in how many of them vowels occur together?

[Marks: (5+5) = 10]

Q. No. 3

(a) Find the present value payment of Tk. 2000, 15 years from now, assuming that we discount at a rate of 5% per year compounded quarterly.

(b) If x= tan Θ + sec Θ , show that Sin Θ = $(x^2-1)/(x^2+1$

[Marks: (4+6) =10]

Q. No. 4

(a) Solve: $42x + 33y - 117 = 0$ and $48x + 27y – 123=0$

(b) A Machine depreciates at the rate of 10% of its value at the beginning of a year. The machine was purchased for Tk. 25,000 and it was sold eventually as waste metal for Tk. 4,500. Obtain the number of year during which the machine was in use.

[Marks: (4+6) = 10]

Q. No. 5

(a) A manufacturing unit produces three types of products A,B and C which it sells in two markets. Annual sales volume is as follows:

Markets	Products		
	A	B	C
I	4,000	3,000	2,000
II	3,000	2,000	1,000

(i) If the unit cost of the above three commodities are Tk. 2.00, Tk. 1.50 and Tk. 1.00 respectively and

(ii) If unit sale prices of A, B and C are Tk. 2.50, Tk. 2.00 and Tk. 1.50 respectively. Then find the total revenue in each market and total profit of both the markets with the help of matrix algebra.

(b) Differentiate with respect to x:
(i) a sin x
(ii) x sin x

[Marks: (6+4) = 10]

Q. No. 6

(a) A company has examined its cost structure and revenue structure and has determined that C the total cost, R total revenue and X the number of unit's products are related as:C = x + 2x^2 − $\frac{x^3}{3}$ and R = 5x. Show that the firm has no maximum or minimum profit.

(b) (i) $\int_3^5 \sqrt{x-3}\, dx$

   (i) $\int_1^2 (2x^3 - 1)\, 6x^2 dx$

[Marks: (5+5) = 10]

Q. No. 7

(a) Find the equation to the straight line which passes through the point of inter section of the straight line $2x + 3y + 4 = 0$ and $3x + 4y - 5 = 0$ and is perpendicular to the straight line $6x - 7y + 8 = 0$.

(b) Solve: $4^{1+x} + 4^{1-x} = 10$

[Marks: (5+5) = 10]

PART – B: BUSINESS STATISTICS

Q. No. 1

(a) Explain the term classification and tabulation, Point out their importance in a statistical investigation.

(b) In the following table the times taken by 40 male students to solve a problem are recorded to the nearest second. construct a frequency distribution.

138	164	150	132	144	125	149	157
146	158	140	147	136	148	152	144
168	126	138	176	163	119	154	165
146	173	142	147	135	153	140	135
161	145	135	142	150	156	145	128

[Marks: (4+6) = 10]

Q. No. 2

(a) What do you understand by central tendency? Explain the various measures of central tendency along with their merits and demerits.

(b) Find out the mean, median and mode from the following series:

Size	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	1	2	5	14	10	9	2

[Marks: (5+5) = 10]

Q. No. 3

(a) Distinguish between karl Pearson's and bowley's coefficient of skewness

(b) Calculate the skewness and Kurtosis from the following distribution and comment on the result:

Profit (Lac Taka)	70-90	90-110	110-130	130-150	150-170
No. of Company	8	11	18	9	4

[Marks: (4+6) = 10]

Q. No. 4
(a) Define dispersion. What are the different absolute and relative measures of dispersion? Why we need relative measures?
(b) Assume that your pathology lab provides the following details of blood tests carried out on 100 Patients for diabetes:

Blood sugar:	90-100	100-110	110-120	120-130	130-140	140-150	150-160
No. of Patients:	16	20	22	25	10	4	3

Calculate coefficient of variation.

[Marks: (4+6) = 10]

Q. No. 5
(a) Distinguish between budget & forecasting.
(b) Identify the components of a time series model.
(c) What are the requirements of a good forecasting system?
(d) Fit a straight line trend by the method of least square.

Years	2007	2008	2009	2010	2011	2012	2013	2014
Profits(millions)	101	100	105	112	114	120	124	134

[Marks: (2+2+2+4) = 10]

Q. No. 6
(a) An experiment was conducted to study the choices made in mutual fund selection. Undergraduate and MBA students were presented with different DSE index funds that are identical except for fees. Suppose 100 undergraduate students and 100 MBA students were selected. Partial results are shown in the following table:

Fund	Students Group	
	Undergraduate	MBA
Highest Cost Fund	27	18
Not Highest Cost Fund	73	82

If a student is selected at random, what is the probability that he or she
(i) Selected the highest cost fund?
(ii) Selected the highest cost fund and is an undergraduate student?
(iii) Selected the highest cost fund or is an undergraduate student?
(iv) Selected the not highest cost fund and is a MBA student?

(b) Calculate karl Pearson's coefficient of correlation from the following date.

Husband's Age	24	27	28	28	29	30	32	33	35	35	40
Wife's Age	18	20	22	25	22	28	28	30	27	30	22

[Marks: (5+5) = 10]

Q. No. 7
(a) What is hypothesis? What steps are necessary to follow of hypothesis testing as statistical tools?
(b) Explain the level of significance & power of a statistical test.
(c) You are working as a purchase manager for a Company. The following information has been supplied to you by two manufacturers of electric bulbs.

Particulars	Company -A	Company-B
Mean life (in hours)	1300	1200
Standard deviation	80	90
Sample size	110	110

Which brand of bulbs are you going to purchase if your desire to take a risk of 5%?

[Marks: (2+1+7) = 10]

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