

**CMA JUNE, 2019 EXAMINATION  
BUSINESS LEVEL  
SUBJECT: GE 03. FUNDAMENTALS OF BUSINESS MATHEMATICS**

Time Allocated: Three hours

Total Marks: 100

**Instructions to Candidates**

You are required to answer ALL questions.		
Answers should be properly structured, relevant and computations need to be shown.		
You are strongly advised to carefully read ALL the question requirements before attempting the question concerned (that is all parts and/or sub-questions).		
ALL answers must be written in the answer book. Answers written on the question paper will not be submitted for marking.		
Start answering each question from a fresh sheet. Your answers should be clearly numbered with the sub-question number then ruled off, so that the markers know which sub-question you are answering.		
No of questions	No of sub-questions	Marks allocation
10	Maximum 03	10 per each question

**TURN OVER**

You are advised to spend no longer than 18 minutes on each question. Each question will carry 10 marks.

### QUESTION NO. 1

- (a) At a value added tax (VAT) rate of 12.5 per cent, an article sells for Tk. 4,500, including VAT. If the VAT rate increases to 15 per cent, what will be the new selling price?
- (b) From the following products of a manufacturing company, identify with required calculations, the products those deserve to get more attention to make profits for the company in accordance with the 80:20 rule (Pareto analysis):

Product line	No of Items	Yearly Profit ('000 Taka)
A	3	120
B	5	25
C	10	30
D	3	100
E	12	76
F	11	10
G	8	9
H	9	0
I	10	144
J	12	36

[Marks: (4+6) = 10]

### QUESTION NO. 2

- (a) Solve the equation:  $\sqrt{1-5x} + \sqrt{1-3x} = 2$
- (b) The following table shows the fluctuations of share price of two companies A and B. Find out which of them shows greater variability. Comment on the result.

Share-A	318	322	325	312	324	315	308	319
Share-B	2542	2522	2534	2532	2545	2530	2566	2550

[Marks: (4+6) = 10]

### QUESTION NO. 3

Mr. Abdus Salam, a professional accountant, is planning to purchase a car in next June 2019. He opened a 6 months Fixed Deposit of Tk. 10 Lacs with interest at 9% with SouthBangla Bank which will mature in June 30, 2019. He visited several car showroom and decided to purchase Honda Vezel 2014 which requires around Tk. 26 Lacs. The following options are available for him:

1. He can borrow whole amount Tk. 26 Lac from a Local Bank (Out of which 80% for car loan and the rest for personal loan; Interest rate of car loan is 11% and personal loan is 13%). Tenor of both loan will be 6 years.
2. He can borrow Tk. 16 Lac with interest rate 11% and duration 6 years from a Local Bank and the rest will cover by his own Fund (Fixed Deposit will mature on next June and he can use the fund to purchase the car).

All loans need to pay monthly installment which covers both principal and interest.

#### Required:

- (a) Calculate the total amount he needs to pay for the car if he selects option 1.
- (b) Calculate the total amount he needs to pay for the car if he selects option 2.
- (c) Recommend which option will be better for Mr. Abdus Salam.

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

**TURN OVER**

**QUESTION NO. 4**

The Checking accounts of Dhaka Bank Ltd. are categorized by the age of account and the account balance. Auditors will select accounts at random from the following 1,000 accounts (numbers in the table are the number of accounts in each category):

<b>Age of the Account</b>	<b>Account Balance</b>		
	<b>&lt; Tk. 50,000</b>	<b>Tk. 50,000-Tk. 499,999</b>	<b>Tk. 500,000 or more</b>
Less than 2 Years	120	240	90
2 years or more	75	275	200

**Required:**

- What is the probability that an account is less than 2 years old?
- What is the probability that an account has a balance of Tk. 500,000 or more?
- What is the probability that two accounts will have both a balance of Tk. 500,000 or more?
- What is the probability that has a balance of Tk. 50,000-Tk. 499,999 given that its age is 2 years or more?

[Marks: (2.5 x 4) = 10]

**QUESTION NO. 5**

The frequency distribution representing the number of frequent flier miles accumulated by employees at Bangladesh Statistical Consulting Inc. is:

<b>Frequent Flier Miles (000)</b>	<b>Number of Employees</b>
0 up to 3	5
3 up to 6	12
6 up to 9	23
9 up to 12	8
12 up to 15	2
<b>Total</b>	<b>50</b>

**Required:**

- What is the mid point of the first class?
- Construct a Histogram.
- Construct a frequency polygon.
- Convert the frequency distribution to a cumulative frequency distribution.
- Portray the cumulative distribution in the form of a cumulative frequency polygon.
- Based on the cumulative frequency polygon, about 75% of the employees accumulated how many miles or less?

[Marks: (1.5 x 5) + 2.5 = 10]

**QUESTION NO. 6**

- An expert was asked to rank, according to taste, eight wines costing below £6. Her rankings (with 1 being the worst taste and 8 the best) and the prices per bottle were as follows:

<b>Sample</b>	<b>Rank of taste</b>	<b>Price</b>
£		£
A	1	4.49
B	2	4.99
C	3	5.49
D	4	4.99
E	5	5.59
F	6	5.99
G	7	5.99
H	8	4.99

Calculate Spearman's rank correlation coefficient for the data and interpret your result.

**TURN OVER**

- (b) A travel agency has kept records of the number of holidays booked and the number of complaints received over the past ten years. The data is as follows:

Year	1	2	3	4	5	6	7	8	9	10
Number of holidays booked:	246	192	221	385	416	279	343	582	610	674
Number of complaints Received:	94	80	106	183	225	162	191	252	291	310

The agency suspects there is a relationship between the number of bookings and the volume of complaints and wishes to have some method of estimating the number of complaints, given the volume of bookings. Denoting number of holidays by X and number of complaints by Y, calculate the value of the correlation coefficient 'r', giving your answer correct to three d.p.

[Marks: (5+ 5) = 10]

### QUESTION NO. 7

- (a) The quarterly sales figures of ABC company from year 20X3 to 20X6 are as follows:

	Sales of article D('000 units)			
	Q <sub>1</sub>	Q <sub>2</sub>	Q <sub>3</sub>	Q <sub>4</sub>
20X3	24.8	36.3	38.1	47.5
20X4	31.2	42.0	43.4	55.9
20X5	40.0	48.8	54.0	69.1
20X6	54.7	57.8	60.3	68.9

Numbering 20X3 Q<sub>1</sub> as t = 1, through to 20X6 Q<sub>4</sub> as t = 16, calculate the equation of the trend (T) as a linear regression line. Use the regression equation to forecast the trend in sales for the four quarters of 20X7.

- (b) Explain in short, the components of time series and state the two models comprising the components.

[Marks: (7+3) = 10]

### QUESTION NO. 8

- (a) A property is mortgaged over 20 years at a rate of 8 per cent per annum. If the mortgage is £70,000, what are the annual repayments? If, after 5 years, the rate is reduced to 7.5 per cent, what are the annual payments reduced?
- (b) Sales figures are given as 547,000 but after seasonal adjustment using a multiplicative model they are only 495,000. Calculate the seasonal component for the particular season, to 3 d.p.

[Marks: (8+2) = 10]

### QUESTION No. 9

- (a) The Net Present Value of a planned investment project has been calculated at interest rates of 8% and 12%. The NPVs are £1,090 and – £960 respectively. What is the Internal Rate of Return of the project to one decimal place?
- (b) A company buys a machine for Tk.20,000. What will be its gain/loss if it sells the machine at Tk.10,000 after 6 years. It is assumed to depreciate at a fixed rate of 12 per cent per annum?
- (c) A retired person wants a fixed cash flow for the rest of the lifetime. On average he wants Tk.10,000 per month. He got the information that the risk-free interest rate was 8% per annum. What amount the retired person should invest to get his desired monthly amount?

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

**TURN OVER**

**QUESTION No. 10**

- (a) In a local town lottery, scratchcard pictures a roulette wheel with thirty-seven numbers, seven of which are randomly arranged winning numbers. The purchaser is allowed to scratch off seven of the thirty-seven numbers in the hope of winning a prize. It is therefore possible to select 0, 1, 2, 3, 4, 5, 6 or 7 winning numbers on each leaflet.
- (i) What is the probability, to three d.p., that the first number scratched does not win a prize?
  - (ii) What is the probability, to four d.p., that all seven numbers scratched do not win prizes?
  - (iii) If there are one million purchases during the promotion and if the probability that all seven numbers do not win a prize were 0.2, what is the expected number of purchasers who will win no prizes at all?
- (b)

	A	B	C	D	E	F
1						
2						
3						
4	Principal=	50000	Interest Rate(p.a.)	12%	Tenure(yrs)	7
5						
6			Future Value	= $(B4*((1+D4)^F4))$		
7						
8			Perpetuity	= $B4*D4$		
9				Value:	??	

From the above spreadsheet find the Future Value (D6), Perpetuity (D8) and re-write the formulae in excel format of  $[(Principal \times Interest Rate) \times Tenure]$  in E9.

**[Marks: 5+(2+1+2) = 10]**

**\*END OF QUESTION PAPER\***