



CHARTERED INSTITUTE OF BANKERS, GHANA

ASSOCIATESHIP EXAMINATION

LEVEL II

**QUANTITATIVE METHODS FOR DECISION-MAKING
APRIL 2023**

N.B.

- 1. Read carefully the instructions on the cover of the answer book.**
- 2. Answer any FOUR (4) questions. Marks for subdivisions of questions are shown in brackets.**
- 3. Each question carries 25 marks.**
- 4. No books, dictionaries, notes or any other written materials are allowed in this examination.**
- 5. Calculators, including scientific calculators are allowed provided they are not programmable and cannot store or recall information. Electronic calculators and personal organizers are not allowed. All workings should be shown.**
- 6. Materials provided:**
 - Formulae sheet and tables for the Normal and Chi-Squared distributions**
 - Graph sheets**
- 7. Time allowed: THREE (3) HOURS.**
- 8. Candidates must ensure that they answer questions in the appropriate answer book and NOT on loose sheets which are supplementary sheets. Such answers will not be marked.**
- 9. DO NOT WRITE YOUR NAME ON THE ANSWER BOOK.**
- 10. DO NOT OPEN THIS QUESTION BOOK UNTIL YOU HAVE BEEN INSTRUCTED TO DO SO.**

ANSWER ANY FOUR QUESTIONS

QUESTION ONE

Central Legon Hospital in Accra recorded the Height (in cm) of 40 patients reporting to the OPD in a day and come up with the following figures:

150	141	158	147	132	153	176	162	180	165
174	133	129	119	133	188	190	165	157	146
161	130	122	169	159	152	173	148	154	171
136	155	141	153	147	168	150	140	161	185

- Explain (briefly) the difference between a percentage frequency bar chart and cumulative percentage frequency bar graph for the height of the 40 patients to the director of the Central Legon Hospital. [5 Marks]
- Using classes 110-119,120-129,130-139 and so on, construct a frequency distribution table for the heights of the 40 patients. [10 Marks]
- Using (b) above, a percentage frequency bar chart and a cumulative percentage frequency bar chart on the same graph. i.e. super-impose the cumulative percentage frequency chart on percentage frequency bar chart. [8 Marks]
- Comment on your charts in (c) above. [2 Marks]

[Total: 25 Marks]

QUESTION TWO

Taaboa a manufacturing firm has decided to capitalize on its existing success by building an extension to its production plant to come on stream by 2028. The firm has evaluated the decision and calculated that its profitability will improve by GHS 650,000.00 if the extension is completed on time. If, however, the extension is delayed then, because of contractual production commitments, the firm stands to lose some GHS 350,000.00. The firm has invited tenders for the construction work and two contractors have been shortlisted. Contractor A has indicated that they would undertake all the work themselves and that they have a track record such that 75 % of previous jobs have been completed on time. Contractor B, on the other hand, has a track record of 95% of jobs being completed on time where Contractor B has done all work. However, Contractor B occasionally subcontracts work to other companies - some 30% of their jobs have a subcontract element in them. Their completion rate on jobs involving subcontractors is less impressive, with 40% of such jobs not being completed on time.

- Explain (in your own words) the term expected monetary value to the manager of Taaboa. [5 Marks]
- Draw a decision tree for the situation Taaboa faces. [15 Marks]
- Using this information, recommend which of the two shortlisted contractors should Taaboa give the job. [5 Marks]

[Total: 25 Marks]

QUESTION THREE

Yaa Tabua Travel arrange a large number of holidays, and in some of these they make administrative mistakes. They are about to change their quality control procedures, and have done some experiments to see how the number of mistakes varies with the number of checks. The following table shows their findings:

Checks	0	1	2	3	4	5	6	7	8	9	10
Mistakes	92	86	81	72	67	59	53	43	32	24	12

- Draw a scatter plot of the data; identify the independent variable, x , and the dependent variable, y . [5 Marks]
- Determine the least square estimates of the regression constant, a , and the regression coefficient, b . i.e $y=a+bx$. [4 Marks]
- Comment on your estimates in (b) above. [2 Marks]
- Calculate the coefficient of determination. [6 Marks]
- Using your line in (b), predict how many mistakes Yaa Tabua would expect with 20 checks and comment on its reliability. [4 Marks]
- Use your estimate in (d), to comment on the suitability of your estimate in (e) above. [4 Marks]

[Total: 25 Marks]

QUESTION FOUR

The following data is number of bars of chocolate consumed by ladies in a tertiary institution in Ga-East Municipal area.

T	1	2	3	4	5	6	7	8
Y	986	1245	902	704	812	1048	706	514

- Explain the terms de-seasonalized trend, seasonal index and forecast value in relation to the data above. [7 Marks]
- Forecast with seasonality and average trend the values for the next four periods of the above time series. [18 Marks]

[Total: 25 Marks]

QUESTION FIVE

Nawaoo is a registered company in the Central Region specialized in electronic products. Nawaoo is involved in manufacturing high-quality electrical equipment. Each item produced costs GHS6,000.00 and the total output is 500 items. At the end of the production process, each item is individually tested for quality and safety. If the item is defective in any way it is scrapped at a complete loss to the firm, since it has been found not to be cost-effective to repair such items. Historically, one item in 1000 is found to be faulty in some way.

- (a) What is the relationship between the mean, mode and median in a non-symmetric data? [7 Marks]
- (b) Determine the probability that the firm will produce zero faulty items in a year. [6 Marks]
- (c) Determine the probability that the firm will produce no more than three faulty items in a year. [6 Marks]
- (d) The firm is considering employing a quality inspector at an additional cost of GHS1000 per year. The Inspector, however, will be able to prevent any item from being defective. Suggest how the firm might evaluate whether employing the inspector would be cost-effective. [6 Marks]

[Total: 25 Marks]

QUESTION SIX

- (a) A petty trader has expressed interest in the purchase of a flat screen TV set from Mr. Obudan, a vendor who operates a hire purchase business. A TV set worth GHS780 may be purchased from Mr. Obudan by making GHS80 down payment and the balance in monthly installments for 2 years.
 - (i) Explain (in your own words) the term “charges 15% (per annum) compounded monthly” to the petty trader. [5 Marks]
 - (ii) Calculate the monthly installment if Mr. Obudan charges 15% compounded monthly, and the first installment is due in one month. [7 Marks]
- (b) The petty trader has made semiannual deposits of GHS500 for 5 years into a savings fund paying interest at 6.25% (per annum) compounded semiannually.
 - (i) Explain (in your own words) the term “charges 6.25% (per annum) compounded semi-annually” to the petty trader. [5 Marks]
 - (ii) Calculate the amount to be deposited semiannually for 2 years to bring the fund up to GHS 10,000.00 [8 Marks]

[Total: 25 Marks]