ASSOCIATESHIP EXAMINATION

LEVEL II

QUANTITATIVE METHODS FOR DECISION-MAKING

[OLD SYLLABUS]

APRIL 2025

N.B.

1. **Read carefully the instructions on the cover of the answer booklet.**
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 must 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 booklet and NOT on loose sheets which may be supplementary sheets. Such answers will not be marked.**
9. **DO NOT WRITE YOUR NAME ON THE ANSWER BOOKLET.**
10. **DO NOT OPEN THIS QUESTION PAPER UNTIL YOU HAVE BEEN INSTRUCTED TO DO SO.**

ANSWER ANY FOUR QUESTIONS

QUESTION 1

The data, presented below provide the average hotel room rates in Accra from 1996 to 2006:

Year	Rates (GHS)	Year	Rates (GHS)
1996	70.63	2002	83.54
1997	75.31	2003	82.52
1998	78.62	2004	86.23
1999	81.33	2005	90.88
2000	85.89	2006	97.78
2001	88.27		

(a) Distinguish between a moving average estimate trend value and least square estimate trend values in relation to the data above. [2 Marks]

(b) Plot the average hotel room rates in Accra from 1996 to 2006 on a graph. [3 Marks]

(c) Using the least squares method of regression, extract the trend value of the average hotel room rates above. [6 Marks]

(d) Compute three yearly moving averages for the average hotel room rates above. [6 Marks]

(e) Super-impose the graphs of your estimated trend values in (c) and (d) on the graph in (b) above. [4 Marks]

(f) Use your estimates in (c) and (d) above to forecast the average hotel rates for 2007 and 2008. [4 Marks]

[Total: 25 Marks]

QUESTION 2

The table below contains the amount of soft drinks in a sample of 50 (2-gram) bottles from shops in Accra:

2109	2086	2066	2075	2065	2057	2052	2044	2036	2038
2031	2029	2025	2029	2023	2020	2015	2014	2013	2014
2012	2012	2012	2010	2005	2003	1999	1996	1997	1992
1994	1986	1984	1981	1973	1975	1971	1969	1966	1967
1963	1957	1951	1951	1947	1941	1941	1938	1908	1894

(a) Using classes intervals 1894-1907,1908-1921…. and so on, construct a group frequency table for the data above. [5 Marks]

(b) Construct a histogram and a percentage polygon from your table in (a) above. [8 Marks]

(c) Construct a cumulative percentage polygon from your table in (b) above. [7 Marks]

(d) On the basis of your results in (b) and (c) above, does the amount of soft drink filled in the bottles concentrate around specific value(s)? Justify your answer. [5 Marks]

[Total: 25 Marks]

QUESTION 3

A Ghanaian paper manufacturer has determined that the distance travelled by each of its sales representative (rep) each year is normally distributed, with a mean of 50 thousand km and a standard deviation of 12 thousand km.

(a) Determine the proportion of sales reps that can be expected to travel between 34 and 50 thousand km in a year. [4 Marks]

(b) Determine the percentage of sales reps that can be expected to travel either less than 30 or more than 60 thousand km in a year. [4 Marks]

(c) Determine the number of km to be travelled by 80% of the sales reps. [5 Marks]

(d) If the standard deviation is changed to 10 thousand km, what are your answers to (a) through (c)? [6 Marks]

(e) Comment on your answers in (d) above. [6 Marks]

[Total: 25 Marks]

QUESTION 4

Mr. Ofon is a businessman who is into sales of Chocolate Bars. Mr. Ofon appraises his employees using the views of two managers (Mr. Nsem and Mr. Asem)

(a) Monthly sales for Mr. Ofon until the past year are:

6 21 41 75 98 132 153 189 211 243 267 301

(i) Use linear regression to forecast sales for the next year. [10 Marks]

(ii) Comment on the reliability of these figures. [2.5 Marks]

(b) Mr. Nsem and Mr. Asem ranks the staff as follows:

Person	A	B	C	D	E	F	G	H	I	J	K	L
Rank 1	5	10	12	4	9	1	3	7	2	11	0	6
Rank 2	6	7	10	1	12	2	4	6	5	9	11	3

(i) Compute the Spearman's Rank correlation coefficient for the ranks. [10 Marks]

(ii) How reliable is the ranking of Mr. Nsem and Mr. Asem? [2.5 Marks]

[Total: 25 Marks]

QUESTION 5

In a period of one month, Abrewatia Bank Ltd recorded a random sample of approved child educational policies, and the total processing time, in days are given as follows:

73	19	16	64	28	28	31	90	60	56
45	48	17	17	17	91	92	63	50	51
31	69	16	56	22	18				

(a) Distinguish between a null hypothesis and an alternative hypothesis in relation to the data above. [4 Marks]

(b) If in the past, the mean processing time was 45 days, test the assertion that the mean processing time has changed. [8 Marks]

(c) What assumption do you need to make about the population distribution to conduct a *t test* of the hypothesis in (b) above ? [5 Marks]

(d) Construct a box plot to evaluate the assumption made in (c) above [5 Marks]

(e) Do you think that the assumption needed in order to conduct the *t test* in (b) is valid ? Explain your answer. [3 Marks]

[Total: 25 Marks]

QUESTION 6

Mama Oboshie plans to invest GHS 1000.00 in a corporate bond fund or in a common stock fund. The following information about the annual return (per GHS 1000.00) of each of these investments under different economic conditions is available, along with the probability that each of these economic conditions will occur:

		RETURNS	
PROBABILITY	**ECONOMIC CONDITION**	**CORPORATE BOND FUND**	**COMMON STOCK FUND**
0.10	Recession	-70	-300
0.15	Slow Growth	30	-100
0.35	Moderate Growth	80	100
0.30	Fast Growth	100	150
0.10	High Growth	120	350

(a) Compute the expected return for the Corporate Bond Fund and for the Common Stock Fund.

[5 Marks]

(b) Compute the standard deviation of the Corporate Bond fund and for the Common Stock Fund.

[9 Marks]

(c) Calculate the covariance of the Corporate Bond Fund and for the Common Stock Fund.

[5 Marks]

(d) Would you advise Mama Oboshie to invest in the Corporate Bond Fund or the Common Stock Fund? Give reason(s) for your answer. [6 Marks]

[Total: 25 Marks]