

7073 BUSINESS MATHEMATICS**(DRAFT)****INTRODUCTION**

Advance Level Business Mathematics primarily deals with the tools and techniques to understand the mathematics associated with managing business operations. It is composed of Statistics and Financial Mathematics. On the one hand, the statistical component considers aspects of probability which plays an important role in developing business strategy. In addition, it treats forecasts and relationships between variables which are an integral part of budgeting and planning. Preparing graphs and tables in summarized formats and using spreadsheets are important in both the analysis of data and the presentation of information to users in their decision making process. The Financial mathematics on the other hand elaborates on interest rates, annuities and investment appraisals of projects.

PROGRESSION OPPORTUNITIES AND CAREER PROSPECTS**(a) Progression Opportunities**

The syllabus for GCE Advanced Level Business Mathematics, 7073 prepares candidates for:

- ✓ Higher Education studies (HND, B.Sc.)
- ✓ Entrance into professional teachers training colleges
- ✓ Professional courses (Association of Charter Certified Accountants, Charter Institute of Management Accountants, Association of Business Executives, Charter Institute of Marketers)
- ✓ Public competitive exams such as School of Statistics and ENAM

(b) Career prospects

Successful candidates of GCE A/L in Business Mathematics, 7073 could be employed by:

- ✓ Microfinance Establishments
- ✓ Banks
- ✓ Decentralized collectivities
- ✓ Companies as Account Assistant or Administrative Assistant.
- ✓ Research and statistics organizations

AIMS

The aim of this syllabus is to equip the candidates with the main mathematical tools and theories used in solving business, social as well as some economic problems. In particular the syllabus is intended:

1. To provide a means of developing skills through quantitative methods.
2. To explore the role of Business mathematics as a tool for better understanding of business studies.
3. To demonstrate the ability to apply mathematics principles and rules in decision making.

OBJECTIVES

Having followed the course, candidates should be expected to

1. Demonstrate an understanding of business mathematics as a supporting tool to management.
2. Collecting, summarizing and interpreting data
3. Prepare and evaluate trends and relationships over time.
4. Apply statistics and probability in a decision making process.
5. Interpret results (quantitative tools) relevant for investment appraisal

NOTE: Knowledge of the Ordinary Level Business Mathematics syllabus in greater depth is expected.

SCHEME OF ASSESSMENT

The GCE Advanced Level Business Mathematics Examination will consist of three papers. All the papers will carry questions from any topic and the solution to any question may require knowledge of more than one topic. Statistical formulae and tables, financial table and formulae will be provided. Non-programmable calculators are allowed.

PAPER ONE: (1 hour 30 minutes)

Paper One will carry 30% of the marks and will be made up of 50 MCQ questions;

PAPER TWO: (3 hours). Written Practical Applications Case Study based on Financial Mathematics and Business Calculations

Paper two will carry 35% of the marks. There shall be elaborate questions of application. Candidates will be expected to answer Question One and six others.

PAPER THREE: (3 hours): Shall test Business Statistics and will be based on case study questions

Paper three will carry 35% of the marks and will be made up of eight questions for a candidate to answer five.

DIFFICULTY LEVEL – The Star system

Paper	Type of questions	Number of questions		Duration	Objectives to test	No. of questions	weight	Level of difficulty		
		Total set	No. to answer					*	**	***
1	MCQ	50	50	1.5 hours	Knowledge	30	30%	60 %	30 %	10 %
					Comprehension					
					Application					
					Analysis	15				
					Synthesis	3				
					Evaluation	2				
2	Case study base on Financial Mathematics and Business calculations	10	7	3 hours	Knowledge	4	35%	60 %	30 %	10 %
					Comprehension					
					Application					
					Analysis	2				
					Synthesis	1				
					Evaluation					
3	Case study based on Business statistics	8	5	3 hours	Knowledge	5	35%	60 %	30 %	10 %
					Comprehension					
					Application					
					Analysis					
					Synthesis					
					Evaluation					

DIFFERENCE BETWEEN THE REVISED SYLLABUS AND THE PREVIOUS ONE.

- ✓ The former syllabuses in A/L business Mathematics have been merged up, harmonized and streamlined to meet the taste of the present trend.
- ✓ The number of papers move from two to three, paper one being MCQ , paper two long-answer-problem solving questions and paper three a written practical paper.

SYLLABUS CONTENTS

I – STATISTICS AND PROBABILITY

TOPICS	SUB TOPICS	EXTEND OF MASTERY REQUIRED AND OTHER RELEVANT EXPLANATORY INFORMATION
1.SAMPLING METHODS	1.1 Definition of sample and sampling 1.2 Importance of sampling 1.3 Techniques (methods) of sampling	- Identify the importance of sampling in statistics - Explain the various types of sampling techniques notably; random sampling, systematic sampling, stratified, cluster, multistage, quota, purposive
2. COLLECTION AND PRESENTATION OF DATA	2.1 Sources of data 2.2 Method of collecting primary data 2.3 Types of data collected 2.4 Presentation of data	- Differentiate between primary and secondary sources of data - Identify the various ways of collecting primary & secondary data - Describe the types of data – qualitative, quantitative, discrete and continuous - Determine group and ungrouped data - Summarize and present data using frequency tables and graphs such as, pictograms, bar charts, pie charts, histograms
3. MEASURE OF CENTRAL TENDENCY	3.1 Mean 3.2 Mode 3.3 Median	- Calculate, interpret and compare the different types of mean (i.e. arithmetic, geometric, harmonic and quadratic mean) - Compare the relationship mean, mode and median in relation to skewness
4. MEASURE OF DISPERSION	4.1 Range 4.2 Mean Deviation 4.3 Variance & Standard Deviation 4.4 Coefficient of variation 4.5 Quartiles 4.6 Skewness and symmetry	- Calculate and interpret the various measures of dispersion - Calculate and interpret the Coefficient of skewness using pearson coefficient of skewness
5. INDEX NUMBERS	5.1 Introduction 5.2 Simple index numbers 5.3 Weighted index numbers (Laspeyres and Paashe indices)	- Define an index number and explain its uses - Calculate and interpret the simple and weighted index numbers
6. CORRELATION AND REGRESSION	6.1 Introduction 6.2 Scattered diagrams 6.3 Correlation coefficient 6.4 Rank correlation	- Define and identify the nature of relationships between two variables - Calculate and interpret the product moment and the spearman's rank correlation coefficients

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	6.5 Regression lines 6.6 Use of regression 6.6 Coefficient of determination 6.7 Relationship between regression and correlation	- Identify the dependent and independent variables - Estimate and interpret a linear regression line of two variables using the Least Square Method and the Mayer's technique - Calculate and explain the coefficient of determination - Identify and explain the connection between product moment correlation and regression.
7. TIME SERIES	7.1 Introduction 7.2 Structure or component of time series 7.3 Models of time series 7.4 Time series trends 7.5 Seasonal variation and Forecasting	- To define, identify and graph a time series, - Identify and describe the components of a time series (cyclical, seasonal, random, general trend). - Apply the additive and multiplicative models - Adjust a trend using techniques such as regression and moving averages - Calculate the seasonal coefficients using the models. - Estimate a future value (i.e. forecast a value at a future time point).
8. PROBABILITY	8.1 Introduction 8.2 Laws of probability 8.3 Conditional probability (Basic knowledge only) 8.4 Permutation and combination 8.5 Probability distributions	- To define concepts such as Experiments, sample space, events, independent and mutually exclusive events. - Apply the laws of probability (multiplicative and additive) in calculating basic probabilities - Draw a probability tree and use to calculate basic probabilities - Have an understanding of conditional probability. - Identify and differentiate business problems in relation to permutation and combination - Calculate expected value and variance
9. DECISION MAKING	9.1 Expected monetary value of a project 9.2 Under certainty 9.3 Under uncertainty and risk	- Calculate the expected monetary value of a project - Make decisions using expected monetary value under conditions of certainty and uncertainty.
10. BINOMIAL AND	10.1 Binomial Distribution	Identify and calculate basic

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POISSON DISTRIBUTION	10.2 Poisson Distribution	probabilities using poisson and binomial probability distributions
11. NORMAL DISTRIBUTION	11.1 The normal curve and table 11.2 Area under the normal curve 11.3 Linear combination of two independent normal distribution 11.4 Sampling distribution of the mean and variance	• To identify a normal distribution curve, the Z-score, the normal distribution table. • Compute probabilities using combination of two linear independent normal distributions. • Compute probabilities using poisson and binomial approximations • Estimate the sampling distribution of the mean and variance
12. ESTIMATION	12.1 Definition of concepts 12.2 Point estimates 12.3 Confidence interval of the population mean 12.4 Small sample statistics	• Define estimator and Estimate; • Identify the various types of estimators: points and confidence intervals • Know basic properties of a good estimator • Construct confidence interval for population mean ONLY • Read the t-distribution table
13. STATISTICAL TEST	13.1 Definition of concepts 13.2 Types of hypothesis 13.3 Types of errors 13.4 One - tailed and two-tailed tests 13.5 Small sample test of the mean	• Define concepts related to Hypothesis, • Explain the two types of hypotheses - the null hypothesis and the alternative. • Differentiate between Type I and type II errors. • Identify and differentiate between a one tailed and two tailed tests • Perform hypothesis test for a single population mean and two population means
14. CHI SQUARE TEST	14.1 Goodness of fit 14.2 Test of independence (2x2 Contingency tables ONLY)	• To perform the calculation of degree of freedom, • Calculate and interpret Chi squares and perform the test of independence using a 2X2 contingency table
15. NETWORK ANALYSIS	15.1 Network planning, activities and events	• To present the PERT graph, activity, calculate the earliest and latest event time, determine the critical part.
16. CONTROL CHART	16.1 Action and warning limits	• Construction and interpretation for mean only.

II – FINANCIAL MATHEMATICS

1. PROGRESSION OR SERIES	1.1 Definition 1.2 Arithmetic progression 1.3 Geometric progression	- Identify and differentiate between an AP and a GP - Determine the sum, the terms, the common difference (or common ratio) for AP and GP respectively - Apply these concepts in business problems such as simple interest
3.COMPOUND INTEREST	3.1 Present values 3.2 Future values 3.3 Nominal and effective interest rates	- Identify compound interest and differentiate it from simple interests. - Construct the compound interest table - Determine the interest rate, and duration. - Calculate and interpret the future value (acquired value); - Compute and interpret present value (The principal) - Examine equivalence of bills or payments at compound interest.
4. DEPRECIATION	4.1 Straight line method 4.2 Reducing balance method 4.3 Sum of digits method	- Calculate and interpret depreciation using the various techniques - Identify the weaknesses of the techniques used
5. ANNUITIES	5.1 Ordinary annuity 5.2 Annuity due 5.3 Hire purchase 5.4 Life assurance (legacy)	- Identify the different types of annuities: annuities due or end-of-period annuities; - Calculate Ordinary annuities or beginning of period annuities. - To calculate the future value (acquired value) of annuity - Compute present value (The principal) annuity - Use knowledge of annuity to solve application problems in hire purchase, life assurance
6.INVESTMENT APPRAISAL	6.1 Payback period 6.2 Accounting rate of return 6.3 Profitability index 6.4 Net Present Value 6.5 Internal Rate of Return (IRR)	- Appreciate an investment project using the various techniques - Identify the advantages and disadvantages of each technique - Use algebra and graphical analyses for calculation of IRR

7. ORDINARY LOANS	7.1 Definition 7.2 Valuation of loan 7.3 Amortization schedules	• Define ordinary loan • Valuation of a loan at a given date • Calculate the rate, the duration, the annuity. • Valuation of outstanding loan. • Preparation of an amortization schedules •
8. DEBENTURES AND BONDS	8.1 Introduction 8.2 Variable annuities and amortizations 8.3 Sinking fund	• Define the debenture • Compare debenture and ordinary loan • The amortizations schedules • Calculate the number of debentures, the annuities, the rate • Calculate both variable annuities and amortization schedule • Calculate and constructs sinking fund schedules
9. STOCK AND SHARES	9.1 Different stocks and shares	• Handle simple cases of buying and selling of stocks and shares; the treatment of commissions.
10. APPLYING MATHEMATIC RELATIONS TO LINEAR PROGRAMMING	10.1 Using linear equations 10.2 Linear programming 10.3 Breakeven analysis 10.4 Application of basic calculus to cost, revenue and profitability analyses	• Solve problems using simultaneous equations up to three variables. • Solve linear programming using equations and graphical • Identify the Feasibility zone and optimum level • Use basic differentiation and integration in solving business problems

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TEXTBOOKS AND REFERENCE MATERIALS

S/N	AUTHORS	TITLES/ISBN	PUBLISHERS
1	A Francis	Business Mathematics and Statistics	Continuum
2	J. Crawshaw and J. Chambers	A concise course in A/L Statistics	
3	J. H. Harvey	Arithmetic of Commerce Intermediate	
4	A. B. Mayne	The Essentials of SCHOOL ARITHMETIC	
5	Michael MUKONTSO	Business Mathematics Made Simple Volume2	Mbasso Publishers 2012

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