



# BUSINESS MATHEMATICS & STATISTICS – PAPER 3

## **OVERALL AIM**

To equip the learner with the basic mathematical and statistical techniques applicable in the business and organisational environment

## **LEARNING OUTCOMES**

On completion of this course, the learner should be able to:

1. Solve business mathematical problems.
2. Use decision-making tools in planning and control of resources.
3. Use differential calculus to maximise outputs and minimise costs

## **LEVEL OF ASSESSMENT**

The syllabus will assess knowledge, comprehension and application.

## **EXAMINATIONS STRUCTURE**

There will be a three hour examination made up sections A and B. Section A will comprise of 20 compulsory multiple-choice questions of 20 marks. Section B will comprise of five questions of 20 marks each, of which the candidate will be required to attempt any four.

## **DETAILED SYLLABUS**

1. Basic Mathematics.
  - (a) Percentages and proportions
  - (b) Indices – Laws of indices and their application
  - (c) Formulae and substitution
  - (d) Equations:
    - (i) Linear
    - (ii) Quadratic
    - (iii) Simultaneous equations in two variables
2. Matrices.
  - (a) Definition and description of a matrix.
  - (b) Identification of data within a matrix.
  - (c) Addition, subtraction and multiplication of matrices.

- (d) Null, identity and inverse matrices.
- (e) Interpreting and solving word problems using matrices
- 3. Set Theory.
  - (a) The concept of a set and its elements – set notation, elements of a set, finite and infinite sets, equal sets, universal sets, the null set
  - (b) Subsets – number of subsets in a set
  - (c) Venn diagrams and their applications
  - (d) Set operations – complement of sets, intersection, and union
  - (e) Cardinality of sets – Number of elements in a set
- 4. Differential Calculus.
  - (a) The role of differential calculus
  - (b) Differentiation - 1st and 2nd derivatives, methods of differentiation (chain, product, and quotient rules)  
(Exclude; 1st principles, exponential and logarithmic functions)
  - (c) Maximum and minimum points
  - (d) Application of the second derivative to maximum and minimum points
  - (e) Differential calculus - marginal cost, marginal revenue and the profit-maximising level of output
- 5. Mathematics of Finance
  - (a) Cash and trade discounts, commissions, mark-up and margins
  - (b) Simple interest
  - (c) Compound interest
  - (d) Present value and future value
  - (e) Effective interest rate
  - (f) Continuous compounding
  - (g) Annuities
    - (i) Sinking fund payments.
    - (ii) Present value of an annuity.
    - (iii) Amortisation.
  - (h) Depreciation Methods: straight line, reducing balance, revaluation, sinking fund, sum of digits, production units, and machine hours methods
- 6. Data Collection.
  - (a) Definition and types of data
  - (b) Sources of data
  - (c) Methods of data collection, merits and limitations of each method
  - (d) Sample and population
  - (e) Sampling techniques

7. Presentation of Data.
  - (a) Tabulation
  - (b) Frequency distributions
  - (c) Preparation, interpretation, usefulness and limitations of pictograms, pie charts, bar charts histograms, Ogives, Lorenz curve and Z charts
  
8. Measures of location/Central tendency.
  - (a) Arithmetic mean, geometric mean, harmonic mean, mode and median
  - (b) Characteristics, merits and limitations of each measure of location
  - (c) Estimating the mode and median graphically
  
9. Measures of Dispersion and Skewness
  - (a) Measures of dispersion - range, mean deviation, standard deviation, quartiles, deciles, percentiles and quartile deviation
  - (b) Skewness - measures of skewness
  - (c) Compare measures of dispersion, location and skewness
  
10. Probability Theory and Distribution.
  - (a) The concept of probability
  - (b) The basic rules of probability (mutually exclusive and independent events)
  - (c) Conditional probabilities
  - (d) Expected values
  - (e) Decision trees
  - (f) Probability distribution functions: Discrete and continuous random variables
  - (g) Permutations and combinations – introduction, meaning of permutation and combination, listing permutations and combinations, factorials, the combination formula, the permutation formula, permutations and probability, combinations and probability, difference between permutation and combinations.
  
11. Introduction to index numbers
  - (a) Uses and limitations of index numbers.
  - (b) Simple indices – price and quantity

## REFERENCES

1. Andre Francis (2008), Business Mathematics and Statistics, South Western and Cengage Learning, 6<sup>th</sup> Edition.
2. Bali N. P, Gandhi C. P and Gupta P. N (2008), A Textbook of Quantitative Techniques, Lami Publications (Pty) Ltd.
3. Crawshaw J and Chambers J (2001), Advanced Level Statistics, Nelson Thornes Ltd, 4<sup>th</sup> Edition.
4. Lucey T (2002), Quantitative Techniques, Book power Publishers, 6<sup>th</sup> Edition.
5. Saleemi N.A (2010), Quantitative Techniques Simplified, Saleemi Publications Ltd.