PAPER C03
Fundamentals of Business Mathematics

Acorn chapters

1   Basic mathematics
2   Algebra techniques
3   Simultaneous and quadratic equations
4   Summarising and analysing data
5   Descriptive statistics
6   Probability
7   The normal distribution
8   Interest rates
9   Accounting for payroll
10   Discounting cash flows
11   Forecasting
12   Spreadsheets

Learning aims

This paper primarily deals with the tools and techniques to understand the mathematics associated with managing business operations. Probability and risk play an important role in developing business strategy. Preparing forecasts and establishing the relationships between variables are an integral part of budgeting and planning. Financial mathematics provides an introduction to interest rates and annuities and to investment appraisal for projects. Preparing graphs and tables in summarised formats and using spread sheets are important in both the calculation of data and the presentation of information to users.

Assessment strategy

There will be a two hour computer based assessment, comprising 45 compulsory questions, each with one or more parts.

A variety of objective test question styles and types will be used within the assessment.

Syllabus structure

The syllabus comprises the following topics and study weightings:

A	Basic mathematics	15%
B	Probability	15%
C	Summarising and analysing data	15%
D	Relationships between variables	15%
E	Forecasting	15%
F	Financial mathematics	15%
G	Spread sheets	10%

Learning outcomes and syllabus content

A – Basic mathematics (15%)

On completion of their studies students should be able to:

(i) calculate answers using formulae
(ii) calculate percentages and proportions
(iii) calculate answers to appropriate decimal places or significant figures
(iv) solve simple equations, including two variable simultaneous equations and quadratic equations
(v) prepare graphs of linear and quadratic equations
(vi) solve simple inequalities

Indicative syllabus content

- use of formulae, including negative powers as in the formula for the learning curve
- order of operations in formulae, including brackets, powers and roots
- percentages and ratios
- rounding of numbers
- basic algebraic techniques and solution of equations, including simultaneous equations and quadratic equations
- graphs of linear and quadratic equations
- manipulation of inequalities

B – Probability (15%)

On completion of their studies students should be able to:

(i) calculate simple probability
(ii) demonstrate the addition and multiplication rules of probability
(iii) calculate a simple conditional probability
(iv) calculate an expected value
(v) demonstrate the use of expected value tables in decision making
(vi) explain the limitations of expected values
(vii) explain the concepts of risk and uncertainty

Indicative syllabus content

- probability and its relationship with proportion and percent
- addition and multiplication rules of probability theory
- Venn diagrams
- expected values and expected value tables
- risk and uncertainty

C – Summarising and analysing data (15%)

On completion of their studies students should be able to:

(i) explain the difference between data and information
(ii) identify the characteristics of good information
(iii) tabulate data
(iv) prepare graphs, charts and diagrams
(v) calculate arithmetic mean, median, mode, range, variance, standard deviation and coefficient of variation, for both ungrouped and grouped data
(vi) explain the concept of frequency distribution
(vii) prepare graphs/diagrams of normal distribution
(viii) explain the properties of normal distribution
(ix) demonstrate the use of normal distribution tables
(x) apply the Pareto distribution and the '80:20' rule
(xi) explain how and why indices are used
(xii) calculate indices using either base or current weights
(xiii) apply indices to deflate a series

Indicative syllabus content

- data and information
- tabulation of data
- graphs, charts and diagrams: scatter diagrams, histograms, bar charts and ogives
- summary measures of central tendency and dispersion for both grouped and ungrouped data
- frequency distributions
- normal distribution
- Pareto distribution and the '80:20 rule'
- index numbers

D – Relationships between variables (15%)

On completion of their studies students should be able to:

(i) prepare a scatter diagram
(ii) calculate the correlation coefficient and the coefficient of determination between two variables
(iii) calculate the regression equation between two variables
(iv) apply the regression equation to predict the dependent variable, given a value of the independent variable

Indicative syllabus content

- scatter diagrams
- correlation coefficient: Spearman's rand correlation coefficient and Pearson's correlation coefficient
- simple linear regression

E – Forecasting (15%)

On completion of their studies students should be able to:

(i) prepare a time series graph
(ii) identify trends and patterns using an appropriate moving average
(iii) identify the components of a time series model
(iv) prepare a trend equation using either graphical means or regression analysis
(v) calculate seasonal factors for both additive and multiplicative models
(vi) explain when each of the additive or multiplicative models is appropriate
(vii) calculate predicted values given a time series model
(viii) identify the limitations of forecasting models

Indicative syllabus content

- time series analysis – trends in time series
- graphical analysis – graphs, moving averages and linear regression.
- seasonal variations using both additive and multiplicative models
- forecasting and its limitations

F – Financial mathematics (15%)

On completion of their studies students should be able to:

(i) calculate future values of an investment using both simple and compound interest
(ii) calculate an annual percentage rate of interest given a monthly or quarterly rate
(iii) calculate the present value of a future cash sum
(iv) calculate the present value of an annuity and a perpetuity
(v) calculate loan/mortgage repayments and the value of the loan/mortgage outstanding
(vi) calculate the future value of regular savings and/or the regular investment needed to generate a required future sum
(vii) calculate the net present value (NPV) and the internal rate of return (IRR) of a project
(viii) explain whether and why a project should be accepted or rejected

Indicative syllabus content

- simple and compound interest
- present value (including using formulae and CIMA tables)
- annuities and perpetuities
- loans and mortgages
- sinking funds and savings funds (including using formulae for the sum of a geometric progression)
- discounting to find net present value (NPV) and internal rate of return (IRR)
- the concept of shareholder value
- interpretation of NPV and IRR

G – Spread sheets (10%)

On completion of their studies students should be able to:

(i) explain the features and functions of spread sheet software
(ii) explain the use and limitations of spread sheet software in business
(iii) apply spread sheet software to the normal work of a chartered management accountant

Indicative syllabus content:

- features and functions of commonly used spread sheet software: workbook, worksheet, rows, columns, cells, data, text, formulae, formatting, printing, graphics and macros (NB: knowledge of Microsoft Excel type spread sheet vocabulary/formulae syntax is required, and formulae tested will be those which are constructed by users rather than pre-programmed formulae)
- advantages and disadvantages of spread sheet software, when compared to manual analysis and other types of software application packages
- Use of spread sheet software in the day to day work of the chartered management accountant: budgeting, forecasting, reporting performance, variance analysis, what if analysis and discounted cash flow calculations