Department of Commerce
University of Delhi
Guidelinesfor Teaching
B.Com. (Hons.)
Paper CH 3.1 Semester –III
Business Mathematics

The following guidelines are in relation to Paper CH 3.1 of B.Com. (Hons) Course (for students admitted in 2011 and after). The guidelines are intended to explain and elaborate, where necessary, as also to lay down the parameters for paper setting.

General guidelines are as:

1. Problems based on trigonometric functions/ ratios are *not* to be included.
2. Emphasis is to be on business and economic applications.No pure mathematics questions to be asked in the examination.
3. The question paper will require a total of five questions to be answered and the choice will be internal.
4. The paper will be set in such a way that a candidate is required to attempt questions from all units of the syllabus. The approximate weightage (for a paper with MM equal to 75) to different units is as follows:
   (a) Unit –I: Matrix Algebra   :12
   (b) Unit II and III: Calculus I and II   :30
   (c) Unit IV: Mathematics of Finance   :15
   (d) Unit V:Linear Programming   :18

Unit-wise guidelines are given as:

1. **Unit –I :Matrix Algebra**
   Focus on business and economic problems both in algebra of matrices and the solution of system of linear equations (two or three variables) including overhead allocation, inter-company holdings (holding companies), input-output analysis etc.
   *Gauss Jordan method and properties of determinant*are not to be done. Only open model and *not the closed model* in input-output analysis is to be done. System of equation with unique solution only is to be covered.

2. **Unit –II :Calculus I**
   Functions: types, limit and continuity. However, the examination paper to have no questions directly on limits and continuity. Principles of differentiation, increasing and decreasing functions, concavity of functions and relative maxima and minima are to be covered. Applications to include cost and revenue functions, elasticity of demand and supply, effects of taxation and subsidy on a monopolist, inventory control (classical EOQ

model), and other general applied problems involving maxima/ minima of functions. (*Problems involving areas and volumes of spheres, cones , cuboids etc. not to be included*)

3. **Unit - III: Calculus II**

   Partial derivatives for functions of two independent variables.Maxima and minima.Homogeneity of functions and Euler's theorem.Total differentials.

   Applications of partial differentiation to optimization of functions. Economic applications including production functions, iso-quants, elasticity of substitution, demand analysis. Constrained optimization usingLangrange multipliersare to be done only for production functions and not for utility functions *(Utility function, indifference curve and Duopoly not to be discussed).*

   Integral calculus: Definite and indefinite integrals. Applications including cost and revenue functions, demand functions, consumers' and producers' surplus and Rate of sales etc.(*excluding learning curve*).

4. **Unit-IV: Mathematics of Finance**

   Simple interest. Compound interest-discrete and continuous compounding nominal and effective rates, interrelationships, force of interest.

   Compounding and discounting of a sum, and a series of sums, using different types of rates. Depreciation.

   Different types of annuities: ordinary, due, deferred, continuous, perpetual. Future and present values using different types of rates of interest.Depreciation of assets. Applications involving sinking funds, valuation of loans and debentures etc. (General annuities are to be excluded).*No direct question involving discount rate to be asked in the examination.*

5. **Unit-V: Linear Programming,**

   Formulation of linear programming problems.Graphic solution.

   Solution to maximization and minimization problems (up to 3 variables) using Simplex algorithm (including Big M method) including cases of mixed constraints. Cases of multiple optimal solutions, infeasibility, unbounded solution- graphically and using Simplex. Degeneracy.

   Duality and its economic interpretation.Writing of dual, including cases of mixed constraints and unrestricted variables. Shadow prices of resources. Comparison of solutions to primal and dual.