

Guidelines for CBCS Revised Syllabus w.e.f. 2019-20
For the Paper Titled

"Business Mathematics" of B. Com. (Hons.)

Paper No. BCH 4.2, Semester-IV

JOINTLY ORGANISED

BY

Department of Commerce, Delhi School of Economics, University of Delhi
And

Acharya Narendra Dev College, University of Delhi

Date: 23rd November 2020

MINUTES

An online meeting was held on Monday, 23rd November, 2020 at 11.00 AM on Google Meet Platform (Meeting ID <https://meet.google.com/ajk-tvtp-uiq>) to prepare the Guidelines for CBCS Revised Syllabus w.e.f. 2019-20 for the paper titled "Business Mathematics" of B. Com. (Hons.) Paper No. BCH 4.2, Semester-IV, jointly organised by Department of Commerce, Delhi School of Economics, University of Delhi and Acharya Narendra Dev College, University of Delhi. Total Fifty-Three (53) faculty members of the different colleges of University of Delhi associated with teaching of this paper registered in advance to attend the meeting and finally Fifty (50) faculty members attended the meeting on the scheduled day, date and on the given link. The meeting was convened by Dr. Sandeep Kumar Goel, Associate Professor, Department of Commerce, Acharya Narendra Dev College and represented by Dr. H. K. Dangi, Associate Professor from the Department of Commerce (DOC), Delhi School of Economics, University of Delhi. The following members were present in the online meeting:

Sl. No.	Name of the Faculty	Department / Affiliated College Name
1	Dr. H. K. Dangi (Representative from DOC)	Department of Commerce, Delhi School of Economics University of Delhi
2	Dr. Sandeep Kumar Goel (Convenor)	Acharya Narendra Dev College, University of Delhi
3	Dr. Jitender Goel	Acharya Narendra Dev College, University of Delhi
4	Ms. Archana Gupta	Indraprastha College for Women, University of Delhi
5	Dr. Archana Agarwal	Sri Aurobindo College (Evening), University of Delhi
6	Dr. Renu Jain	Satyawati College, University of Delhi
7	Dr. Sonali Jain	Bharati College, University of Delhi
8	Ms. Suman Kharbanda	Shivaji College, University of Delhi
9	Dr. Seema Gupta	Deshbandhu College, University of Delhi
10	Dr. Renu Gambhir	Rajdhani College, University of Delhi
11	Dr. Arun Julka	Maharaja Agrasen College, University of Delhi
12	Dr. Meghna Malhotra	Hansraj College, University of Delhi

13	Dr. Mandakini Das	Gargi College, University of Delhi
14	Dr. Parul Goel	Aditi Mahavidyalaya, University of Delhi
15	Ms. Garima Bhardwaj	PGDAV COLLEGE EVE., University of Delhi
16	Dr. Gunjan Khanna	Lakshmibai College, University of Delhi
17	Dr Gurmeet Bakshi	Jesus and Mary College, University of Delhi
18	Dr. Gurmeet Kaur	Daulat Ram College, University of Delhi
19	Dr. Jitendra Kumar Singh	Aryabhatta College, University of Delhi
20	Ms. Harpreet Kaur	Sri Guru Gobind Singh College of Commerce, University of Delhi
21	Ms. Ishleen Kaur Rekhi	Mata Sundri College for Women, University of Delhi
22	Ms. Khushboo Aggarwal	P.G.D.A.V. College, University of Delhi
23	Ms. Laxmi	Vivekananda College, University of Delhi
24	Dr. Mamta Arora	Sri Venkateswara College, University of Delhi
25	Ms. Manisha	Kirori Mal College, University of Delhi
26	Mr. Mayur Taneja	Rajdhani College, University of Delhi
27	Dr. Naveen Dua	Sri Guru Gobind Singh College of Commerce, University of Delhi
28	Dr. Neelam Gupta	Dr. B.R.Ambedkar College, University of Delhi
29	Ms. Neeti Nagar	Shaheed Bhagat Singh College, University of Delhi
30	Ms. Neha Rohra	Indraprastha College for Women, University of Delhi
31	Ms. Nishtha Bhushan	Bharati College, University of Delhi
32	Mr. Om Dutt	Swami Shraddhanand College, University of Delhi
33	Mr. Pardeep Singh	Aryabhatta College, University of Delhi
34	Dr. Pavan Gupta	Vivekanand College, University of Delhi
35	Dr. Poonam Bewtra	Janki Devi Memorial College, University of Delhi
36	Dr. Poonam Sethi	Hindu College, University of Delhi
37	Mr. Praveen Sewta	Lakshmibai College, University of Delhi
38	Dr. Rachan Sareen	Sri Guru Teg Bahadur Khalsa College, University of Delhi
39	Ms. Rachna Gupta	Ramanujan College, University of Delhi
40	Dr. Ruma Debnath	Zakir Hussain Delhi College, University of Delhi
41	Ms. Seema Agarwal	PGDAV College, University of Delhi
42	Dr. Shashi Nanda	PGDAV College, University of Delhi
43	Dr. Srishti Pathak	Ramlal Anand College, University of Delhi
44	Ms. Sunita	P.G.D.A.V. College, University of Delhi
45	Dr. Triveni	Shaheed Bhagat Singh Eve. College, University of Delhi
46	Ms. Parminder Kaur	Sri Guru Teg Bahadur Khalsa College, University of Delhi
47	Dr. Indu Gupta	Dyal Singh Evening College, University of Delhi
48	Mr. Kamna Virmani	Mata Sundri College for Women, University of Delhi
49	Dr. Neelam Goel	Shyama Prasad Mukherji College, University of Delhi
50	Ms. Parthivi Khurana	Kalindi College, University of Delhi

All the faculty members present participated actively in the deliberation. The following guidelines were set in the online meeting with the consent of all the Faculty Members and the Representative of Department of Commerce, Delhi School of Economics, University of Delhi:

A. Unit-wise Details of the Course Contents

Unit I: Matrices and Determinants

- 1.1 Definition and types of matrix, Algebra of matrices, Inverse of a matrix- Business Applications.
- 1.2 Solution of system of linear equations (having unique solution and involving not more than three variables) using matrix inversion method and Cramer's Rule.
- 1.3 Leontief Input Output Model (Open Model Only).

Unit II: Basic Calculus

- 2.1 Mathematical functions and their types (linear, quadratic, polynomial, exponential, logarithmic and logistic function). Concepts of limit and continuity of a function.
- 2.2 Concept of Marginal Analysis. Concept of Elasticity, Applied Maxima and Minima problems including effect of Tax on Monopolist's Optimum price and quantity, Economic Order Quantity.

Unit III: Advanced Calculus

- 3.1 Partial Differentiation: Partial derivatives up to second order. Homogeneity of functions and Euler's theorem. Total differentials. Differentiation of implicit functions with the help of total differentials.
- 3.2 Maxima and Minima involving two variables – Applied optimization problems and Constraint optimization problems using Lagrangean multiplier involving two variables having not more than one constraint.
- 3.3 Integration: Standard forms & methods of integration- by substitution, by parts and by use of partial fractions. Definite integration. Finding areas in simple cases
- 3.4 Application of Integration to marginal analysis; Consumer's and Producer's Surplus. Rate of sales, The Learning Curve.

Unit IV: Mathematics of Finance

- 4.1 Rates of interest: nominal, effective and their inter-relationships in different compounding situations.
- 4.2 Compounding and discounting of a sum using different types of rates. Applications relating to Depreciation of assets and Equation of value.
- 4.3 Types of annuities: ordinary, due deferred, continuous, perpetual. Determination of future and present values using different types of rates of interest. Applications relating to Capital expenditure, Leasing, Valuation of simple loans and debentures, sinking fund. (excluding general annuities).

Unit V: Linear Programming

5.1 Formulation of Linear programming problems (LPPs), Graphical solutions of LPPs. Cases of unique solutions, multiple optimal solutions, unbounded solutions, infeasibility, and redundant constraints.

5.2 Solution of LPPs by simplex method - maximization and minimization cases. Shadow prices of the resources, Identification of unique and multiple optimal solutions, unbounded solution, infeasibility and degeneracy.

5.3 The dual problem: Formulation, relationship between Primal and Dual LPP, Primal and Dual solutions (excluding mixed constraints LPPs). Economic interpretation of the dual.

Practical Lab

In addition to the lectures, the students are expected to work on a software package for solving linear programming problems, problems related to mathematics of finance and analyze the results obtained there from. This will be evaluated through internal assessment.

B. Teaching Related General Guidelines

1. There shall be 4 Credit Hrs. for Lectures + one Credit Hr. (Two Practical Periods per week per batch) for Practical Lab + one credit Hr. for Tutorials (per group).
2. Total Number of Lectures Assigned as per CBCS University of Delhi Revised Syllabus for Business Mathematics are 52 Theory Classes & 26 Practical Classes i.e. total 78 Lectures.
3. Unit Wise and Practical Lab Based Breakup of 78 Lectures is recommended as given below follow:

Unit I: Matrices and Determinants: 8 Lectures

Unit II: Basic Calculas: 6 Lectures

Unit III: Advanced Calculas: 14 Lectures

Unit IV: Mathematics of Finance: 10 Lectures

Unit V: Linear Programming: 14 Lectures

Practical Lab: 26 Lectures

4. Examination paper to have no question directly on limits and continuity.
5. Emphasis is to be on business and economic applications.
5. Proofs of theorems/ formulae are not required.
6. Problems based on trigonometric functions/ratios are not to be included.
7. The students should get familiar with Spreadsheet to solve problems of Mathematics of Finance and Linear Programming.

C. Assessment Methods

The Assessment for this paper would include a theory exam of 75 marks and Internal assessment of 25 marks. Internal assessment will include 10 marks for practical exam, 10 marks for class tests/assignments, and 5 marks for attendance.

D. Theory Examination Related General Guidelines

1. Use of simple calculator is allowed.
2. The question paper will require a total of five questions to be answered and the choice will be internal. However, in each question, a part-wise choice will be given. To illustrate, for a question with two parts (a) and (b), each one will have a choice individually.

3. 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 theory paper of maximum marks 75 to different units is as follows:
Unit I: Matrices and Determinants: 12 Marks
Unit II: Basic Calculus: 12 Marks
Unit III: Advanced Calculus: 18 Marks
Unit IV: Mathematics of Finance: 15 Marks
Unit V: Linear Programming: 18 Marks
4. The members opined that due to ongoing pandemic situation, if classes are being conducted online and examination are held in OBE format, it is requested to hold the guidelines meeting again in the month of March 2021.

The Officiating Principal of Acharya Narendra Dev College, Dr. Ravi Toteja and all the faculty members present in the meeting appreciated the timely initiative of Prof. Reetesh Kr. Singh, the HOD, Department of Commerce and expressed sincere thanks to Dr. Amit Kumar Singh, Coordinator, Associate Professor, Commerce Department, University of Delhi, for the interest shown by him in executing this meeting and specially thanked to Dr. H. K. Dangi, Representative, Associate Professor, Commerce Department, University of Delhi, for his valuable insights and support throughout the meeting.

The meeting ended with a vote of thanks to the Officiating Principal of Acharya Narendra Dev College, Dr. Ravi Toteja, the HOD, Department of Commerce, Prof. Reetesh Kr. Singh, Coordinator, Department of Commerce, Dr. Amit Kumar Singh, Representative, Department of Commerce, Dr. H. K. Dangi and Convener of the meeting Dr. Sandeep Kumar Goel.



Dr. Sandeep Kumar Goel
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