

DSQT1001	<b>Business Mathematics</b>	L	T	P	C
<b>Version 1.0</b>		3	0	0	3
<b>Pre-requisites/Exposure</b>	<ul style="list-style-type: none"> <li>Upto 12<sup>th</sup> level set theory, function, limits, continuity, number, surds, Indices, Algebra, trigonometry, mathematical symbols and notations and few basic formulae.</li> </ul>				
<b>Co-requisites</b>	Mathematical symbols and notations and few basic formulae.				

### Course Objectives

- To understand the basic concepts of Mathematics.
- To have a proper understanding of mathematical applications in Economics, Finance, Commerce and Management

### Course Outcomes

On completion of this course, the students will be able to:

- CO1. Explain the concepts and use equations, formulae, and mathematical expressions and relationships in a variety of contexts
- CO2. Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems
- CO3. Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business.
- CO4. Integrate concept in international business concepts with functioning of global trade

### Catalog Description

This course provides complete skill to understand basic function of Mathematics and their use in Business and Finance. After completing the course, student will be able to solve business and finance problems. A particular emphasis is placed on developing the ability to interpret the numerical information that forms the basis of decision-making in business. Most of the examples are drawn from a variety of business applications. It examines aspects of business and marketing with regards to basic statistical analysis. Students will be provided with the theoretical concepts, tools and methods of mathematics as well as the opportunity to work through example problems.

### Course Content

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#### Unit I: **11 Hours** **Determinants, Matrices, Set Theory & Progression**

Self and Subject introduction, Prerequisite Mathematics, Fast calculation, Introduction to Matrices, Types of Matrices, Transpose of a Matrix, Properties of transpose, Determinants and Non Singularity, Rank of a Matrix, Matrix Method, Cramer's Rule, Union of Sets, Intersection of Sets, Multiplication of Sets, Arithmetic Progression, Geometric Progression.

**Unit II: 08 Hours**

**Differentiation**

Introduction to functions-linear/Non-linear and their Graphs, Rules of differentiation, Chain rule, Product rule, Maxima and Minima, Point of inflexion, Second order Derivatives, Logarithmic Differentiation, Exponential Differentiation.

**Unit III: 06 Hours**

**Integration**

Integration by substitution, Integration by parts, Definite Integral, Basic Rules of Integration, Methods of Integration using basic formula

**Unit IV: 11 Hours**

**Economic Application (from all the units)**

**Matrices:** National Income model, Input-Output Analysis

**Differentiation:** Application of chain rule, Logarithmic differentiation, Rate of growth and decay, Elasticity of a function

**Demand function:** Price demand, price elasticity of demand, Income demand and Income elasticity of demand, Cross demand and cross elasticity of demand

**Law of supply:** Elasticity of supply

**Maximization of profit:** Effect of a specific tax on equilibrium output or price, Maximization of tax revenue

**Integration:** Total revenue and marginal revenue, Demand function from elasticity of demand, Total cost from marginal cost, Profit function from marginal profit function

**Text Books**

1. Bhardwaj, R.S. (2005). *Business Mathematics*. New Delhi, Excel Books.

**Reference Books**

1. Khan, S.M. (2012). *A textbook of Business Mathematics*. Viva Books Private Limited.
2. Sancheti, D.C. and Kapoor, V.K. (2014). *Business Mathematics*. S. Chand & Sons.
3. Soper, J. (2004) *Mathematics for Economics and business: An Interactive Introduction*. Wiley-Blackwell.
4. Schultheis, R.A. and Kaczmariski, R.M. (2005) *Business Math*. Cengage South Western.

**Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Examination Scheme:**

Components	Mid term	End term	Internal evaluation	Total
Weightage (%)	20	50	30	100

**Relationship between the Course Outcomes (COs) and Program Outcomes (POs)**

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Programme Outcomes
CO1	Explain the concepts and use equations, formulae, and mathematical expressions and relationships in a variety of contexts	PO 1,8,9,10,11
CO2	apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems	PO 1,3,7,9,11
CO3	Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business.	PO 1,2,5,7,8,9,12
CO4	Integrate concept in international business concepts with functioning of global trade	PO 6,7,8,9,10,12

**Program Outcome/Course Outcome Mapping**

Course Outcomes	CO 1	CO 2	CO 3	CO 4
PO 1	3	3	3	1
PO 2	1	2	3	1
PO 3	2	3	1	2
PO 4	1	2	3	1
PO 5	1	2	1	2
PO 6	2	1	1	3
PO 7	1	3	3	3
PO 8	3	1	3	3
PSO 9	3	3	3	3
PSO 10	3	2	1	3

<b>PSO 11</b>	3	3	1	2
<b>PSO 12</b>	1	2	3	3

<b>Course Code</b>	<b>Course Title</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 9</b>	<b>PSO 10</b>	<b>PSO 11</b>	<b>PSO 12</b>
<b>DSQT 1001</b>	<b>Business Mathematics</b>	3	3	2	1	2	1	3	3	2	3	2	3
		Students will demonstrate strong conceptual knowledge of management & its functional areas.	Students will demonstrate effective oral and written communication skills in the professional context.	Students will be able to work effectively in teams and demonstrate team building capabilities.	Students will be able to evaluate the legal, social and economic environments of business.	Students will be able to describe the global environment of business.	Students will demonstrate sensitivity towards ethical and moral issues and have ability to address them in the course of business.	Students will be able to apply decision-support tools to business decision making.	Students will be able to apply knowledge of business concepts and functions in an integrated manner.	Students will demonstrate conceptual domain knowledge of the Foreign Trade.	Students will apply decision-support tools to decision making in Foreign Trade.	Students will apply conceptual knowledge of Foreign Trade an integrated manner.	Students will demonstrate employable and deployable skills for appropriate roles in management.

1=weakly mapped,  
2= moderately mapped,  
3=strongly mapped

## **Model Question Paper**

Name:

Enrolment No:



Course: DSQT1001 Business Mathematics

Programme: BBA ( FT )

Time: 03 hrs.

Semester: I ODD-2017-20

Max. Marks: 100

Instructions:

Note: All sections are compulsory & this question paper carries 4 sections.

Section A (20)

Q.1 to 2 each has 5 parts and each part carries 2 marks for correct answer. There is no negative marking

1.	<p><b>Q.1</b> Fill in the blanks:</p> <p>a)</p> $\int_2^2 \left( x^3 - x^2 + \frac{5}{x^2} \right) = \underline{\hspace{2cm}}$ <p>b) If production is _____ then loss is equal to fixed cost.</p> <p>c) Relationship between Price and quantity demanded is called _____.</p> <p>d)</p> $\frac{\text{Revenue}}{\text{quantity sold}}$ <p>Is also called _____ function</p> <p>e) If for any function at x=c, first derivative is zero and second derivative is positive then at x=c function will have its _____ value.</p> <p><b>Q.2</b> State with reasons which of the following statements is true or false:</p> <p>a) Matrix inverse exist only when determinant is zero.</p> <p>b) Following series is an Arithmetic Progression</p> $3 + 5 + 9 + 12 + 16 + \dots$ <p>c) For a given set <math>\{b\} \in \{\{b\}\}</math>.</p> <p>d) Matrix <math>A = \begin{bmatrix} 3 &amp; 1 \\ 6 &amp; 4 \end{bmatrix}</math> is singular matrix.</p> <p>e) Rank of <math>\begin{bmatrix} 0 &amp; 1 \\ 0 &amp; 1 \end{bmatrix}</math> is 2.</p>	<p>CO1 CO2  CO2  CO4  CO3  <b>(2*10=20 marks)</b>  CO2 CO3  CO1 CO2 CO1</p>	
<p><b>SECTION B (20 Marks)</b> <b>Attempt all the question of this section, each question carries 5 marks only</b></p>			
2.	<p><b>Q.3</b> Compute</p>	<p><b>(5*4= 20 marks)</b></p>	

	$5A^2 + 4A' + 7I$ <p>Where I is unit matrix and</p> $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ <p><b>Q.4</b> Among the 450 students of a class, 200 passed in mathematics and 300 passed in economics. If 30 students failed in both, how many students passed in both the subject.</p> <p><b>Q.5</b> Find the inverse of the matrix</p> $A = \begin{bmatrix} 1 & -2 & 1 \\ 0 & -1 & 2 \\ -2 & 1 & -1 \end{bmatrix}$ <p><b>Q.6</b> A firm produced 2000 sets of T.V. during its first year. The total sets produced at the end of 5 years is 14000. Estimate the annual rate of increase in production if the increase in each year is uniform.</p>		CO2
			CO3
			CO2
			CO4
	<b>SECTION C(30 marks)</b>		
	<b>(Attempt any 5 question, each question carries 6 marks only)</b>		
3.	<p><b>Q.7</b> Find the derivative of the following function</p> $\frac{x^2 + 3x + 1}{x^2 - x + 1}$ <p><b>Q.8</b> Find the maximum and minimum value of the function</p> $y = \frac{1}{3}x^3 - 2x^2 + 3x + 1$ <p><b>Q.9</b> Find the point of inflexion on the curve and determine at that point curve changes from convex to concave (Type-I) or concave to convex(Type-II).</p> $y = x^4 - 6x^2 + 8x - 1$ <p><b>Q.10</b> Evaluate</p> $\int (x + 2)\sqrt{2x^2 + 2x + 1} dx$ <p><b>Q.11</b> Evaluate following using integration by part</p> $\int (2x^3 - x^2)(6x^2 - 25) dx$ <p><b>Q.12</b> Using Properties of definite integral prove that</p> $\int_{-1}^1 (x^3 - 5x) dx + \int_{-2}^2 (16x^2 - 3x^4) dx$ $= 2 \int_0^2 (16x^2 - 3x^4) dx - \int_{-3}^3 (12x^3 - 5x) dx$		CO1
			CO3
			CO2
		(6*5=30 marks)	CO3
			CO4

CO3

**SECTION D (30 marks)**

**Attempt any 3 of the following question out of the 4 & provide the solution**

4.

**Q.13** A salesman has the following record of sales during three months for three items which have different rate of commission.

**(10\*3=30 marks)**

Month	Sales of units			Total commission in ₹
	A	B	C	
January	90	100	20	800
February	130	50	40	900
March	60	100	30	850

Using Matrix methods find out the rate of commission of items **A, B, and C.**

CO4

**Q.14** The total revenue received from the sale of x units of a product is given by

$$R(x) = 200x - \frac{x^2}{5}$$

Find

- The average revenue function
- The marginal revenue function and Marginal revenue, when  $x=20$
- Actual revenue from the sale of 21<sup>st</sup> unit.

CO3

**Q.15** XYZ Ltd. find that the cost of production of one unit is ₹( $\frac{x}{3} - 10$ ) and the fixed cost is ₹300. Calculate the output at which the cost is minimum also calculate average cost and marginal cost at that output.

CO1

**Q.16** If, MC is marginal cost and MR is marginal revenue and

$$MC = 20 + \frac{x}{30}, \text{ and } MR = 35,$$

The fixed cost is 2500, determine the maximum profit and profit maximising level output.

CO2

(i)