



**INTERNATIONAL MANAGEMENT INSTITUTE  
BHUBANESWAR**

**PROGRAMME NAME: POST GRADUATE DIPLOMA IN MANAGEMENT (PGDM)  
BUSINESS MATHEMATICS (QM501)  
CREDIT: FULL (2 CREDITS)  
SESSION DURATION: 60 MINUTES**

**TERM: I  
ACADEMIC YEAR: 2021-2022  
BATCH: PGDM (2021)**

**Faculty:** Prof. Rajesh Katiyar  
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**Office hours:** 9.30 AM – 5.30 PM

**Course Introduction:** Mathematics is a tool required to allow you to excel in business. Business mathematics is clearly an example of a body of ideas and techniques where the whole is bigger than the sum of its parts. This course addresses the need of executives to get acquainted with the basic concepts and areas of managerial applications of mathematics, probability and operation research. The course would help the students to understand the relevance of mathematics in business decision making.

**Learning Outcomes:**

This course discusses the basics of Business Mathematics and their applications which help students to improve their analytical skills. At the end of the course, the student will be able:

1. To understand the basic concepts of mathematics and their applications to solve the business and real-life problems.
2. To enable the student to gain a quantitative orientation.
3. To improve the ability to formulate and resolve complex decision problems in a practical manner.
4. To provide insight into various quantitative methods of decision making, their uses and limitations.

**Course Pedagogy:** The class interaction will be mix of interactive lectures, class discussions and will be supplemented by real life examples, case discussions and exercises. In each session students will have hands-on exercises and through these exercises they will understand application of concept of mathematics into business scenarios.

**Course Readings:**

- Trivedi, K. and Trivedi, C. (2011). *Business Mathematics*. Pearson Education. (BM).
- Raghavachari, M. (1980). *Mathematics for Management*. Tata McGraw Hill Education Pvt. Ltd., New Delhi. (MFM).
- Taylor, B.W. (2017). *Introduction to Management Science*. Pearson. (IMS).
- Levin, R.I., Rubin, D.S., Siddiqui, M.S. and Rastogi, S. (2017). *Statistics for Management*, 8<sup>th</sup> Edition. Pearson Education, New Delhi (SFM).

### Course Evaluation Criteria:

Evaluation Component	Learning Outcomes	Weightage (%)
Class Participation (class exercise and case/problem discussion)	LO-3, LO-4	10%
Quiz (2)*	LO-1, LO-2, LO-4	30%
Group Viva**	LO-1, LO-2, LO-3	20%
End-Term	LO-1, LO-3, LO-4	40%
<b>Total</b>		<b>100%</b>

\* Quiz 1 and 2 will be held after 10 and 18 sessions, respectively.

\*\*Viva can be scheduled any time after 18 classes.

### Session Plan:

Session	Topic	Learning Outcomes	Readings
1-2	<b>Introduction to course and Matrices</b> <ul style="list-style-type: none"> <li>❖ Operations on matrices (addition, subtraction &amp; multiplication)</li> <li>❖ Scalar multiplication</li> <li>❖ Transpose of a matrix</li> <li>❖ Properties of transpose</li> <li>❖ Symmetric &amp; Skew-symmetric matrix</li> </ul>	LO - 1 LO - 2 LO - 3	<b>Text book:</b> (MFM: Ch-8, Page No. 110-138) (BM: Ch-22, Page No. 549-562) (Attempt: Prisoner's dilemma)
3-4	<ul style="list-style-type: none"> <li>❖ Properties of Determinant</li> <li>❖ Adjoint matrix</li> <li>❖ Inverse of a matrix</li> <li>❖ Linear equations (by Matrix method and Cramer's rule)</li> </ul>		<b>Text book:</b> (MFM: Ch-8, Page No. 118-124, 138-147; Ch-9, Page No. 154-164) (BM: Ch-21, Page No. 514-519, 527-533; Ch-22, Page No. 563-571, 576-579, 594-599) (Attempt: How to decode a message by using matrix and its inverse? Other applications of addition and subtraction matrices)
5-6	<b>Progressions</b> <ul style="list-style-type: none"> <li>❖ Arithmetic progression</li> <li>❖ Sum of an A.P.</li> <li>❖ Arithmetic mean</li> <li>❖ Geometric progression</li> <li>❖ Sum of a G.P.</li> <li>❖ Business &amp; economic application of A.P. &amp; G.P. series</li> </ul>	LO - 1 LO - 3	<b>Text book:</b> (MFM: Ch-7, Page No. 89-102) (BM: Ch-26, Page No. 658-696) (Attempt: Some business & economic applications of A.P. & G.P. series)
7-8	<b>Linear Programming</b> <ul style="list-style-type: none"> <li>❖ Two-variable LP model</li> <li>❖ Model formulation</li> <li>❖ Graphical LP solution</li> </ul>	LO - 1 LO - 2 LO - 3 LO - 4	<b>Text book:</b> (IMS: Ch-2, Page No. 51-81) (MFM: Ch-14, Page No. 339-356)

9-10	<ul style="list-style-type: none"> <li>❖ Solution of a maximization model</li> <li>❖ Solution of a minimization model</li> </ul>		<b>Text book:</b> (IMS: Ch-2, Page No. 51-81) (Attempt: Diet problem-Ozark Farms and The Reddy Mikks Company problem through solver)
11-13	<b>Transportation Model</b> <ul style="list-style-type: none"> <li>❖ Introduction to transportation</li> <li>❖ Balancing the transportation model</li> <li>❖ North-west corner method</li> <li>❖ Least-cost method</li> <li>❖ Vogel approximation method (VAM)</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> (MFM: Ch-14, Page No. 357-370) (IMS: Ch-6, Page No. 257-266) (Attempt: The SunRay Transport Company problem and The Wheat Shipping problem through solver)
14-16	<b>Probability</b> <ul style="list-style-type: none"> <li>❖ Concept of probability</li> <li>❖ Types of probability and probability rules</li> <li>❖ Probability under conditions of statistical independence</li> <li>❖ Probability under conditions of statistical dependence</li> <li>❖ Bayes' theorem</li> </ul>	LO – 1 LO – 4	<b>Text book:</b> (MFM: Ch-10, Page No. 182-196) (SFM: Ch-4, Page No. 153-189)
17-20	<b>Probability Distribution</b> <ul style="list-style-type: none"> <li>❖ Types of probability distribution</li> <li>❖ Random variables</li> </ul> <b>Decision Theory</b> <ul style="list-style-type: none"> <li>❖ Use of expected value in decision making. <ul style="list-style-type: none"> <li>- Maximizing profits</li> <li>- Conditional profits</li> <li>- Expected profits</li> </ul> </li> <li>❖ Expected value with perfect information</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> (SFM: Ch-5, Page No. 207-215, 222-254) (Attempt: Lucknow Railway Station problem) <b>Text book:</b> (SFM: Ch-5, 218-222; Ch-17, Page No. 897-905) (Attempt: Strawberry Dealer problem and National Sports Stadium problem)
	<b>Group Viva</b>		

### Academic integrity

**a) Plagiarism** is the use of or presentation of ideas, works that are not one's own and which are not common knowledge, without granting credit to the originator. Plagiarism is unacceptable in IMI and will invite penalty. Type and extent of penalty will be at the discretion of the concerned faculty.

**b) Cheating** means using written, verbal or electronic sources of aid during an examination/ quiz/ assignment or providing such assistance to other students (except in cases where it is expressly permitted by the faculty). It also includes providing false data or references/list of sources which either do not exist or have not been used, having another individual write

your paper or assignment or purchasing a paper for one's own submission. Cheating is strictly prohibited at IMI and will invite penalty as per policies of the Institute.

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