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| **Course Code** | | |  | **MATHEMATICS AND STATISTICS FOR MANAGEMENT**  ***For BBA/BBA(CA)/BBA(IB)/BBA(RM)*** | **L** | **T** | | **P** | **C** | |
| **Allied – I** | | | |  |  | **-** | | **-** |  | |
| **Pre-requisite** | | | | **+2 Business Maths** | **Syllabus**  **Version** | | **First** | | | |
| **Course Objectives:** | | | | | | | | | | |
| To make the students to understand the process of solving mathematics and interpret the final results and to train the students to apply the mathematical and statistical tools and techniques while solving business problems in their career. The course will also serve as a prerequisite for post graduate and specialized studies and research. | | | | | | | | | | |
| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | | Solve systems of linear equations by use of the matrix | | | | | | **K3** | | |
| 2 | | Be able to find the nature (maximum and minimum) of a turning point | | | | | | **K5** | | |
| 3 | | Outline the meaning of marginal revenue and marginal cost and their relevance for firm’s profitability. | | | | | | **K1** | | |
| 4 | | Understand and compute the sampling distributions, sampling distributions of means and variances (S2) and the t- and F-distributions | | | | | | **K1** | | |
| 5 | | Summarize a regression analysis, and compute and interpret the coefficientof  correlation. | | | | | | **K2** | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create | | | | | | | | | | |
| **Unit:1** | | | **MATRICES** | |  | | | | | |
| Matrices: Fundamental ideas about matrices and their operational rules – Matrix multiplication Inversion of square matrices of not more than 3rd order- solving system of simultaneous linear equations. | | | | | | | | | | |
| **Unit:2** | | | **SET THEORY** | |  | | | | | |
| Set theory – Introduction - Types of sets - set operation - Venn Diagrams - Simple and Compound Interest.(Simple problems only) | | | | | | | | | | |
| **Unit:3** | | | **STATISTICAL METHODS** | |  | | | | | |
| Meaning and Definitions of Statistics - Scope and Limitations. Collections of data –primary data and secondary data - Presentation of data by Diagrammatic and Graphical Method - Formation of Frequency Distribution. | | | | | | | | | | |
| **Unit:4** | | | **MEASURES OF CENTRAL TENDENCY AND MEASURES OF VARIATION** | |  | | | | | |
| Measures of Central tendency - Arithmetic Mean, Median and Mode.  Measures of Variation: Standard deviation | | | | | | | | | | |
| **Unit:5** | | | **CORRELATION AND REGRESSION** | |  | | | | | |
| . . Simple Correlation - Karl Pearson‘s Co-efficient of correlation – Rank correlation - Regression lines. | | | | | | | | | | |
| **Unit:6** | | | **CONTEMPORARY ISSUES** | |  | | | | | |
| Expert lectures, online seminars – webinars | | | | | | | | | | |
| **Questions in THEORY and PROBLEMS carry 20% and 80% marks respectively Problems need to be simple keeping students’ non-mathematical background** | | | | | | | | | | |
| **Text Book(s)** | | | | | | | | | | |
| 1 | | S.P. Gupta (S.P.): “Statistical Methods”, Sultan Chand & Sons, 34th Edition,2007 | | | | | | | | |
| 2 | | Richard Levin & David Rubin, “Statistics for management”, Prentice Hall, 2008 | | | | | | | | |
| **Reference Books** | | | | | | | | | | |
| 1 | | Sundaresan and Jayaseelan- An Introduction to Business Mathematics and Statistical Method | | | | | | | | |
| 2 | | P.R.Vittal, “Business Mathematics”, Margham publications 2nd edition, 2003. | | | | | | | | |
| 3 | | S.P. Rajagopalan and R. Sattanathan, Business Statistics and Operation Research, Tata McGraw-Hell publishing company Ltd., 2nd edition, 2009. | | | | | | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | | | | | | | |
| 1 | | <http://www.dphu.org/uploads/attachements/books/books_5117_0.pdf> | | | | | | | | |

### Mapping with Programme Outcomes

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | S | S | S | S | M | S |
| **CO2** | S | S | S | S | S | S | S | S | S | S |
| **CO3** | S | M | M | S | S | S | M | M | S | S |
| **CO4** | M | S | M | S | M | M | S | M | S | M |
| **CO5** | S | S | S | S | M | S | S | S | S | M |

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| **Course Code** | |  | **QUANTITATIVE TECHNIQUES FOR MANAGEMENT**  ***For BBA/BBA(CA)/BBA(IB)/BBA(RM)*** | **L** | | **T** | **P** | **C** |
| **Allied - II** | | |  |  | | - | - |  |
| **Pre-requisite** | | | **MATHEMATICS AND STATISTICS FOR MANAGEMENT** | **Syllabus**  **Version** | | | **First** | |
| **Course Objectives:** | | | | | | | | |
| The main objective of this course is to make the students to gain knowledge about various concepts of Operations Research and to identify and develop operational research models from the verbal description of the real system and train them to apply the operations  research tools that are needed to solve optimization problems. | | | | | | | | |
| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Define and formulate linear programming problems and evaluate their applications | | | | | | **K1** | |
| 2 | To understand concepts and terminology of Linear Programming from formulation of mathematical models to their optimization using Simplex Method | | | | | | **K1** | |
| 3 | To comprehend the concept of a Transportation Model and develop the initial  solution and optimality checking of the solution | | | | | | **K2** | |
| 4 | To apply the strategies of game theory and to make better decisions while solving business problems | | | | | | **K3** | |
| 5 | Use critical path analysis and programming evaluation and review  techniques for timely project scheduling and completion. | | | | | | **K3** | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create | | | | | | | | |
| **Unit:1** | | **INTRODUCTION TO OPERATION RESEARCH** | | | |  | | |
| Introduction to Operations Research – Meaning – Scope – Applications - Limitations. Linear programming-Mathematical Formulation-Application in management decision making  (Graphical method only). | | | | | | | | |
| **Unit:2** | | **TRANSPORTATION PROBLEMS** | | | |  | | |
| Transportation problems: Introduction- Finding Initial Basic Feasible solutions- moving towards optimality (non degenerate only) – Maximization in transportation problem- | | | | | | | | |
| **Unit:3** | | **ASSIGNMENT PROBLEMS** | | |  | | | |
| Assignment problem: Introduction –Hungarian Assignment method – Maximization in Assignment problem – Unbalanced Assignment problem. | | | | | | | | |
| **Unit:4** | | **GAME THEORY** | | |  | | | |
| Game theory: Concept of Pure and Mixed strategies – solving 2 x 2 matrices with and without saddle point. Graphical solution - mx2 and 2xn games | | | | | | | | |

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| **Unit:5** | | **NETWORK ANALYSIS** |  |
| CPM–Principles–Construction of network- Critical path –Forward pass–Backward pass computations–PERT | | | |
| **Unit:6** | | **CONTEMPORARY ISSUES** |  |
| Expert lectures, online seminars – webinars | | | |
| **Note: THEORY and PROBLEM shall be distributed as 20% and 80% respectively.** | | | |
| **Text Book(s)** | | | |
| 1 | P. K. Gupta, Man Mohan, Kanti Swarup: “Operations Research”, Sultan Chand, 2008. | | |
| 2 | J. K. Sharma: Operations Research Theory & Applications, Macmillan India Limited, fifth  edition.2013 | | |
| **Reference Books** | | | |
| 1 | Kanti Swarup, P.K.Gupta and Man Mohan – Operations Research | | |
| 2 | Sundaresan V, Ganapathy K.S, Ganesan K, Resource Management Technique- Lakshmi  Publications, 2003. | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://nptel.ac.in/courses/111/105/111105077/ | | |
| 2 | https://nptel.ac.in/content/syllabus\_pdf/111105077.pdf | | |

### Mapping with Programme Outcomes

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** |
| **CO1** | S | S | S | M | S | S | S | S | M | S |
| **CO2** | S | S | S | S | S | S | S | S | S | S |
| **CO3** | S | M | M | S | S | S | M | M | S | S |
| **CO4** | M | S | M | S | M | M | S | M | S | M |
| **CO5** | S | S | S | S | M | S | S | S | S | M |