# REPORT ON
# CO-PSO-PO ASSESSMENT AND ATTAINMENT

## FIRST DEGREE PROGRAM IN MATHEMATICS

## BATCH 2020-23

## SUBMITTED BY

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**DEPARTMENT OF MATHEMATICS**

**Forwarded by: Head of the Department**

# 1. Program Outcomes and Program Specific Outcomes

| UNDERGRADUATE PROGRAMMES - BA/BSc/BCom | |
|---|---|
| **PO1** | **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. |
| **PO2** | **Problem Solving**: Identify, formulate, conduct investigations, and find solutions to problems based on in-depth knowledge of relevant domains. |
| **PO3** | **Communication**: Speak, read, write and listen clearly in person and through electronic media in English/language of the discipline, and make meaning of the world by connecting people, ideas, books, media and technology. |
| **PO4** | **Responsible Citizenship**: Demonstrate empathetic social concern, and the ability to act with an informed awareness of issues. |
| **PO5** | **Environment and Sustainability:** Understand the impact of technology and business practices in societal and environmental contexts, and sustainable development |
| **PO6** | **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings. |
| **PO7** | **Computational Thinking:** Understand data-based reasoning through translation of data into abstract concepts using computing technology-based tools |

| Name of the program: First degree program in Mathematics (BSc Mathematics) | |
|---|---|
| **PSO1** | Understand basic facts about mathematics such as axioms, notations, terminology. |
| **PSO2** | Understand various mathematical techniques and apply to scientific problems. |
| **PSO3** | Formulate mathematical arguments in a logical manner. |
| **PSO4** | Apply numerical techniques and computer algebra systems to solve various mathematical problems. |

# 2. Course Outcomes

| Semester 6 | | | |
|---|---|---|---|
| **MM 1641**<br><br>**Credits: 4** | **Real Analysis-II** | **CO1** | Understand Continuous function and Describe basics results on Continuous functions |
| | | CO2 | Understand Differentiable function and Describe basics results on Differentiable functions |
| | | **CO3** | Understand Integrable function and Describe basics results on Integrable functions |
| | | **CO4** | Apply results of continuous, Differentiable and Integrable function on geometrical problems |
| **MM 1642**<br><br>**Credits: 3** | **Complex Analysis-II** | **CO1** | Explain the series representation of analytic functions using power series. |
| | | **CO2** | Classify singularities and evaluate residues. |
| | | **CO3** | Evaluate real integrals using the residue theorem. |
| | | **CO4** | Explain the concept of conformal mapping and Mobius transformation. |
| **MM 1643**<br><br>**Credits: 3** | **Abstract Algebra-Ring Theory** | **CO1** | Understand the concept of ring and subring. |
| | | **CO2** | Compare ideals and factor rings |
| | | **CO3** | Apply division algorithm for polynomials over a field |
| | | **CO4** | Test irreducibility and reducibility |
| **MM 1644**<br><br>**Credits: 4** | **Linear Algebra** | **CO1** | Solve systems of linear equations and interpret their results |
| | | **CO2** | Understand the concept of vector space and its dimension |
| | | **CO3** | Demonstrate an understanding of linear transformations |
| | | **CO4** | Perform and interpret matrix operations |
| | | **CO5** | Compute and interpret determinants of matrices; |
| | | **CO6** | Demonstrate an understanding of vector spaces and subspaces |
| | | **CO7** | Demonstrate an understanding of eigenvalues and eigenvectors; |
| **MM 1645** | **Integral Transforms** | **CO1** | Explain Laplace transforms |
| | | **CO2** | Discuss differentiation and integration of transforms. |

| | | | |
|---|---|---|---|
| **Credits: 3** | | **CO3** | Describe Fourier series and transforms. |
| | | **CO4** | Discuss Fourier integrals. |
| **MM 1661.1**<br><br>**Credits: 2** | **Graph Theory (Elective Course)** | **CO1** | Understand the basic knowledge about graphs and define basic terms associated with them |
| | | **CO2** | Define trees and discuss about their connectivity |
| | | **CO3** | Describe Euler and Hamiltonian graphs and apply them to solve certain real life problems |
| | | **CO4** | Understand planar graphs and derive Euler's formula |

# 3. CO-PSO-PO Attainment for the semester

| | **MINIMUM ATTAINMENT LEVEL FOR CO-PSO-PO** | | | | | |
|---|---|---|---|---|---|---|
| **Semester 6** | **Course Code** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| | **MM 1641** | 2.00 | 2.00 | 1.50 | 2.00 | - |
| | **MM 1642** | 2.00 | 2.00 | 2.00 | 2.00 | 1.50 |
| | **MM 1643** | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| | **MM 1644** | 2.00 | 1.50 | 2.00 | 2.00 | 1.50 |
| | **MM 1645** | 1.50 | 1.50 | 1.50 | 1.50 | - |
| | **MM 1651** | 2.00 | 2.00 | 2.00 | 2.00 | |

| **Semester 6** | **Course Code** | **PO1** | **PO2** | **PO3** | **PO7** | **PSO1** | **PSO2** | **PSO3** | **PSO4** |
|---|---|---|---|---|---|---|---|---|---|
| | **MM 1641** | 1..50 | 1.50 | 1.00 | 1.00 | 1.50 | 2.00 | 1.50 | -- |
| | **MM 1642** | 1.50 | 1.50 | - | 1.50 | 1.50 | 1.75 | 1.50 | 2.00 |
| | **MM 1643** | 1.50 | 1.50 | - | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| | **MM 1644** | 1.50 | 1.50 | - | 1.50 | 1.50 | 1.50 | 1.50 | - |
| | **MM 1645** | 1.50 | 1.50 | - | - | 1.50 | 1.50 | 1.50 | 1.50 |
| | **MM 1651** | 1.50 | 1.50 | | 1.50 | 1.50 | 1.50 | 1.50 | - |

## CO Attainment

| | Course Code | CO1 | CO2 | CO3 | CO4 | CO5 | Remarks |
|---|---|---|---|---|---|---|---|
| Semester 6 | **MM 1641** | 2.62 | 2.62 | 2.62 | 2.62 | - | |
| | **MM 1642** | 2.56 | 2.56 | 2.56 | 2.56 | 2.56 | |
| | **MM 1643** | 0.60 | 0.60 | 0.60 | 0.60 | 0.59 | |
| | **MM 1644** | 2.10 | 2.10 | 2.10 | 2.10 | 2.10 | |
| | **MM 1645** | 1.49 | 1.49 | 1.49 | 1.49 | - | |
| | **MM 1651** | 3.00 | 3.00 | 2.90 | 2.82 | | |

## PSO-PO Attainment

| | Course Code | PO1 | PO2 | PO3 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Semester 6 | **MM 1641** | 1.75 | 1.50 | 2.00 | 1.50 | 1.25 | 2.25 | 1.75 | -- | |
| | **MM 1642** | 1.70 | 1.70 | - | 1.70 | 1.70 | 1.92 | 1.28 | 2.56 | |
| | **MM 1643** | 0.52 | 0.40 | - | 0.33 | 0.60 | 0.40 | 0.40 | 0.60 | |
| | **MM 1644** | 1.05 | 1.22 | - | 1.16 | 1.05 | 1.22 | 1.40 | - | |
| | **MM 1645** | 0.99 | 0.99 | - | - | 1.24 | 0.99 | 0.99 | 0.87 | |
| | **MM 1651** | 2.50 | 1.75 | | 1.00 | 3.00 | 2.00 | 2.00 | - | |

| | Course Code | Overall Mapping | Minimum attainment | Overall Attainment | Remarks |
|---|---|---|---|---|---|
| Semester 6 | **MM 1641** | 1.71 | 1.50 | 1.50 | |
| | **MM 1642** | 2.11 | 1.50 | 1.79 | |
| | **MM 1643** | 2.32 | 1.50 | 0.46 | Not attained |
| | **MM 1644** | 1.69 | 1.50 | 1.18 | Not attained |
| | **MM 1645** | 2.04 | 1.50 | 1.01 | Not attained |
| | **MM 1651** | 2.04 | 1.50 | 2.04 | |

# 4. CO-PSO-PO Attainment-Gap Analysis

| Course code | Course outcome | Attainment Level for last year | Minimum attainment level(MAL) | Attainment Level (AL) | Gap | Analysis/ Suggestions |
|---|---|---|---|---|---|---|
| MM 1641 | CO1 | 2.00 | 2.00 | 2.62 | No gap | |
| | CO2 | 2.00 | 2.00 | 2.62 | | |
| | CO3 | 1.50 | 1.50 | 2.62 | | |
| | CO4 | 2.00 | 2.00 | 2.62 | | |
| MM 1642 | CO1 | 2.00 | 2.00 | 2.56 | No gap | |
| | CO2 | 2.00 | 2.00 | 2.56 | | |
| | CO3 | 2.00 | 2.00 | 2.56 | | |
| | CO4 | 2.00 | 2.00 | 2.56 | | |
| | CO5 | 1.50 | 1.50 | 2.56 | | |
| MM 1643 | CO1 | 1.50 | 1.50 | 0.60 | Not fully attained | Reduce MAL, gap due the low marks in ESE. |
| | CO2 | 1.50 | 1.50 | 0.60 | | |
| | CO3 | 1.50 | 1.50 | 0.60 | | |
| | CO4 | 1.50 | 1.50 | 0.60 | | |
| | CO5 | 1.50 | 1.50 | 0.60 | | |
| MM 1644 | CO1 | 2.00 | 2.00 | 2.10 | No gap | Increase MAL |
| | CO2 | 1.50 | 1.50 | 2.10 | | |
| | CO3 | 2.00 | 2.00 | 2.10 | | |
| | CO4 | 2.00 | 2.00 | 2.10 | | |
| | CO5 | 1.50 | 1.50 | 2.10 | | |
| MM 1645 | CO1 | 1.50 | 1.50 | 1.49 | No gap | Review on target percentage for ESE |
| | CO2 | 1.50 | 1.50 | 1.49 | | |
| | CO3 | 1.50 | 1.50 | 1.49 | | |
| | CO4 | 1.50 | 1.50 | 1.49 | | |
| MM 1651 | CO1 | 2.00 | 2.00 | 3.00 | | Increase the MAL |
| | CO2 | 2.00 | 2.00 | 3.00 | | |
| | CO3 | 2.00 | 2.00 | 2.90 | | |
| | CO4 | 2.00 | 2.00 | 2.82 | | |

| Course code | PO/PSO | Attainment Level for last year | Minimum attainment level(MAL) | Attainment Level (AL) | Gap | Analysis/ Suggestions |
|---|---|---|---|---|---|---|
| MM 1641 | PO1 | 1.50 | 1.50 | 1.75 | No gap | |
| | PO2 | 1.50 | 1.50 | 1.50 | | |
| | PO3 | 1.00 | 1.00 | 2.00 | | |
| | PO7 | 1.00 | 1.00 | 1.50 | | |
| | PSO1 | 1.50 | 1.50 | 1.25 | Not attained | Review on target |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | percentage for ESE |
| | PSO2 | 2.00 | 2.00 | 2.25 | No gap | |
| | PSO3 | 1.50 | 1.50 | 1.75 | | |
| | PSO4 | - | - | - | | |
| MM 1642 | PO1 | 1.50 | 1.50 | 1.70 | No gap | |
| | PO2 | 1.50 | 1.50 | 1.70 | | |
| | PO3 | - | - | - | | |
| | PO7 | 1.50 | 1.50 | 1.70 | | |
| | PSO1 | 1.50 | 1.50 | 1.70 | | |
| | PSO2 | 1.75 | 1.75 | 1.92 | | |
| | PSO3 | 1.50 | 1.50 | 1.28 | Not fully attained | |
| | PSO4 | 2.00 | 2.00 | 2.56 | | |
| MM 1643 | PO1 | 1.50 | 1.50 | 0.52 | Not fully attained | Reduce MAL, gap due the low marks in ESE. |
| | PO2 | 1.50 | 1.50 | 0.40 | | |
| | PO3 | - | - | - | | |
| | PO7 | 1.50 | 1.50 | 0.33 | | |
| | PSO1 | 1.50 | 1.50 | 0.60 | | |
| | PSO2 | 1.50 | 1.50 | 0.40 | | |
| | PSO3 | 1.50 | 1.50 | 0.40 | | |
| | PSO4 | 1.50 | 1.50 | 0.60 | | |
| MM 1644 | PO1 | 1.50 | 1.50 | 1.05 | No fully attained | Review on target percentage for ESE |
| | PO2 | 1.50 | 1.50 | 1.22 | | |
| | PO3 | - | - | - | | |
| | PO7 | 1.50 | 1.50 | 1.16 | | |
| | PSO1 | 1.50 | 1.50 | 1.05 | | |
| | PSO2 | 1.50 | 1.50 | 1.22 | | |
| | PSO3 | 1.50 | 1.50 | 1.40 | | |
| | PSO4 | - | - | - | | |
| MM 1645 | PO1 | 1.50 | 1.50 | 0.99 | Not fully attained | Review on target percentage for ESE |
| | PO2 | 1.50 | 1.50 | 0.99 | | |
| | PO3 | - | - | - | | |
| | PO7 | - | - | - | | |
| | PSO1 | 1.50 | 1.50 | 1.24 | Not fully attained | |
| | PSO2 | 1.50 | 1.50 | 0.99 | | |
| | PSO3 | 1.50 | 1.50 | 0.99 | | |
| | PSO4 | 1.50 | 1.50 | 0.87 | | |
| MM 1651 | PO1 | 1.50 | 1.50 | 2.50 | No gap | Increase the MAL |
| | PO2 | 1.50 | 1.50 | 1.75 | | |
| | PO3 | - | - | - | | |
| | PO7 | 1.50 | 1.50 | 1.00 | | |
| | PSO1 | 1.50 | 1.50 | 3.00 | | |
| | PSO2 | 1.50 | 1.50 | 2.00 | | |
| | PSO3 | 1.50 | 1.50 | 2.00 | | |
| | PSO4 | - | - | - | | |