The pattern of question paper for MT -233, MT-243 is given in the detailed syllabus.

Equivalence of Previous syllabus along with new syllabus:

	Semester-III		Semester-IV	
	New Course	**Old Course**	**New Course**	**Old Course**
Paper I	**MT-231: Calculus of Several Variables**	**MT-211 : Multivariable Calculus-I**	**MT-241:Linear Algebra**	**MT-221: Linear Algebra**
Paper II	**MT-232(A): Numerical Methods and Its Applications** **MT-232(B): Graph Theory**	**MT-212(A): Discrete Mathematics** **MT- 212(B): Laplace Transform and Fourier Series**	**MT-242(A): Vector Calculus** **MT-242(B): Dynamical Systems**	**MT-222(A): Multivariable Calculus - II** **MT-212(B): Numerical Analysis**
Paper III	**MT-233: Mathematics Practical based on MT-231 and MT-232**	**MT-213 : Mathematics Practical based on MT-211 and MT-212**	**MT-243: Mathematics Practical based on MT-241 and MT-242**	**MT–223: Mathematics Practical based on MT-221 and MT-222**

Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules).

Semester – III

MT-231: Calculus of Several Variables

Unit-1 Limits and Continuity   **[06 lectures]**

    1.1 Functions of Several Variables :- Functions of two variables, Domain and Range,

        Graphs, Level Curves, Functions of Three or More Variables

    1.2 Limits and Continuity.

Unit-2 Partial Derivatives and Differentiability   **[10 lectures]**

    2.1 Definition and examples.

    2.2 Higher Derivatives, Clairaut's Theorem (Statement Only) , Partial Differential

        Equations, Wave equation.

2.3 Differentiable function, Differentials

2.4 Chain Rule, Homogeneous Functions, Euler's theorem

Unit-3 Extreme Values [08 lectures]

3.1 Extreme values of functions of two variables.

3.2 Necessary conditions for extreme values.

3.3 Second Derivative Test (without proof).

3.4 Lagrange Multipliers (with one constraints)

Unit-4 Multiple Integrals [12 lectures]

4.1 Iterated Integrals, Fubini's Theorem (Statement only)

4.2 Double integral over general regions, Change of order of integration for two variables.

4.3 Double integral in Polar coordinates.

4.4 Triple integrals , Evaluation of triple integrals. Triple integrals in spherical coordinates

4.5 Jacobians , Change of variables in multiple integrals .(Results without proofs)

Text book: Multivariable Calculus 7th Edition By James Stewart, Brooks/Cole, Cengage Learning, 2012, 2008.
   Unit 1:- Chapter 14: Sec- 14.1, 14.2
   Unit 2:- Chapter 14: Sec- 14.3(except the Cobb-Douglas production function), 4.4
                    (except Tangent Planes and Linear Approximations), Sec-14.5
   Unit 3:- Chapter 14: Sec 14.7, 14.8 (except two constraints)
   Unit 4:- Chapter 15: Sec 15.2, 15.3, 15.4, 15.7 (without Riemann sum and
                    Application), 15.9, 15.10

Reference Books:

1. Basic Multivariable Calculus, J. E. Marsden, A. J. Tromba , A. Weinstein, Springer

Verlag (Indian Edition).

2. Shanti Narayan, R.K. Mittal, A Text-book of Vector Calculus, S.Chand and Company.

3. D.V. Widder, Advanced Calculus (2nd Edition), Prentice Hall of India ,NewDelhi,(1944).

4. T.M. Apostol , Calculus Vol. II (2nd Edition), John Wiley, New York, (1967).

MT-232(A): Numerical Methods and It's Applications

Unit1: Solution of Algebraic and Transcendental Equations [10 Lectures]
   1.1 Errors and their computations
   1.2 Bisection method.
   1.3 The method of False position
   1.4   Newton- Raphson method
Unit 2: Interpolation [12 Lectures]