



UNIVERSITY OF CALCUTTA

Notification No. CSR/26/2026

It is notified for information of all concerned that in terms of the provisions of Section 54 of the Calcutta University Act, 1979, (as amended), and, in the exercise of his powers under 9(6) of the said Act, the Vice-Chancellor has, by an order dated 03.02.2026, approved the following amendments in the Syllabus and Course Structure of Mathematics under CCF, 2022, as published under CSR/29/2025, dt. 26.05.2025 & CSR/92/2025, dt. 09.12.2025 respectively:

1. Amendments in the CSR/29/2025, dt. 26.05.2025

The course content of the paper "MTH-DSCC-14-TH: Multivariate Calculus-II & Application of Calculus", as published under CSR/29/2025, dt. 26.05.2025 is amended & the amended syllabus including Question patterns are enclosed.

2. Amendments in the CSR/92/2025, dt. 09.12.2025

The name of the paper MMTH-MDC-CC-7 is inadvertently misprinted as "Advanced Calculus & Advanced Algebra". This is incorrect.

The correct name of the paper MMTH-MDC-CC-7 IS "Mathematical Methods", as mentioned in the CSR/29/2025, dt. 26.05.2025

The above shall take immediate effect.

SENATE HOUSE

Kolkata-700073

10.04.2026

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2026

Prof. (Dr.) Debasis Das

Registrar

The course content of **MTHM-DSCC-14-TH** for the 4-year Honours with Major in Mathematics (with and without research under CCF), as published vide notification no. CSR/29/2025 dated 26.05.2025 and the **question pattern for the same**, as published vide notification no. CSR/03/2026 dated 14.01.2026 have been revised. The updated course content and the updated question pattern are given below.

MTHM-DSCC-14-TH

Multivariate Calculus-II & Application of Calculus

Full Marks: 100 (Theory: 75 and Tutorial: 25)

Group A: Multivariate Calculus [Marks : 45]

[35 classes]

- Functions from $\mathbb{R}^n$ ($n > 1$) to $\mathbb{R}^m$ ($m \geq 1$). Continuity and differentiability of such functions. Jacobian matrix. A function $f : \mathbb{R}^n \rightarrow \mathbb{R}^m$ is differentiable if and only if its every component is differentiable.
- Inverse function theorem (statement only), implicit function theorem (statement only).
- Level sets, tangent spaces.
- Definition of vector field, divergence and curl, the Laplacian, vector identities.
- Integrals over curves and surfaces: Line integrals, fundamental theorem for line integrals - simply connected domains, conservative fields, the potential function, irrotational fields, independence of path, oriented surfaces, parametrized surfaces, area of a surface, surface integrals, volume integrals.
- Integral theorems of vector analysis: Green's theorem in plane, Stoke's theorem, Gauss' Divergence theorem. (Emphasis should be given on problem solving instead of rigorous theoretical treatment).

Group B : Applications of Calculus [Marks : 30]

[25 classes]

- Tangents and normals, pedal equation of a curve, pedal of a curve.
- Curvature (Cartesian, Polar and pedal form). Curvature at the origin - Newton's theorem. Radius of curvature, centre of curvature, evolute of a curve.
- Rectilinear asymptotes of a curve (Cartesian and parametric form only).
- Concavity, convexity and points of inflection of a curve.
- Envelopes (Cartesian coordinates only and up to two parameters) of families of straight lines and curves.
- Singular points – nodes, cusps.
- Curve tracing in Cartesian and polar coordinates of standard curves.

References

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- [2] G. B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
- [3] M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
- [4] E. Marsden, A. J. Tromba and A. Weinstein, Basic Multivariable Calculus, Springer (SIE), 2005.
- [5] J. Stewart, Multivariable Calculus, Concepts and Contexts, 2nd Ed., Brooks /Cole, Thomson Learning, USA, 2001.
- [6] T. Apostol, Mathematical Analysis, Narosa Publishing House, 1969.
- [7] R. Courant and F. John, Introduction to Calculus and Analysis, Vol II, Springer-Verlag, 1998.
- [8] W. Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill.
- [9] H. R. Beyer, Calculus and Analysis, Wiley, 2010.
- [10] H. F. Davis and A. D. Snider, Introduction to Vector analysis, Universal Book Stall, 6th Ed., 1992.

Question Pattern -

MTHM-DSCC-14 (Multivariate Calculus II and Application of Calculus)

Group A : Multivariate Calculus (45 marks)

- (a) Short answer type: 5 questions are to be attempted out of 8 questions each carrying 3 marks. Each question may have further parts.
- (b) Long answer type: 5 questions are to be attempted out of 8 questions each carrying 6 marks. Each question may have further parts.

Group B : Application of Calculus (30 marks)

Long answer type: 6 questions are to be attempted out of 9 questions each carrying 5 marks. Each question may have further parts.