

Under-Graduate Programme with MATHEMATICS; 3rd Semester

MATHEMATICS

MMT326N: CALCULUS – II

Theory: 4 Credits (60 Hours)

MINOR COURSE

Credits: 4 THEORY + 2 TUTORIAL

Tutorial: 2 Credits (30 Hours)

Course Objectives: (i) To study and understand the notions of integral calculus and to imbibe the acquaintance for using the techniques in other sciences and engineering. (ii) To prepare the students for taking up advanced courses of mathematics.

Course outcome: The techniques involved in the course shall be used to estimate area and to solve complex problems.

Theory: 4 Credits

Unit –I

Standard cases of partial fractions, Integration of rational functions when the denominator consists of repeated and un-repeated linear factors and also with quadratic factors. Integration of Irrational functions. Integration of functions like $\frac{1}{a+b \cos x}$ etc.

Unit –II

Reduction Formulae of the functions: $\int \sin^n x \, dx$, $\int \cos^n x \, dx$, $\int \tan^n x \, dx$, $\int \cot^n x \, dx$, $\int \sec^n x \, dx$, $\int \operatorname{cosec}^n x \, dx$, $\int \sin^m x \cos^n x \, dx$, $\int x^m \cos nx \, dx$, $\int \sin^m x \sin^n x \, dx$, $\int \cos^m x \cos^n x \, dx$. Definite Integrals with properties, definite integral as limit of sum.

Unit –III

Fundamental theorem of calculus, Differentiation under an integral sign, Rectification: Rules for curve tracing, formula for rectification and examples. Beta and Gamma functions: their properties and applications.

Unit –IV

Quadrature. Area of a region bounded by a curve, x-axis (y-axis) and two ordinates (abscissa), sectorial areas bounded by a closed curve. Lengths of plane curves. volumes and areas of surfaces of revolution.

Tutorial: 2 Credits

Unit –V

Examples based on Unit-I and Unit-II.

Unit –VI

Examples on Beta and Gamma functions, examples based on applications of Beta and Gamma functions, examples based on area under curve, area between two curves arc length and volume.

Recommended Books:

1. Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand, 2020
2. Schaums outline of Theory and problems of Differential and Integral Calculus, 4th edition-2018.
3. S. D. Chopra and M. L. Kochar, Integral Calculus, Kapoor Sons.
4. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc. 11th edition-2016.
5. T.M. Apostol, Calculus Vol. I, John Wiley & Sons Inc. 2nd edition.
6. S. Balachandra Rao and C. K. Shantha, Differential Calculus, New Age Publication.
7. S. Lang, A First Course in Calculus, Springer-Verlag.
8. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons. 10th edition - 2011.
9. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 15th edition-2018.