SEMESTER - 2nd

MINOR   COURSE

MMT222N: MATHEMATICS / APPLIED MATHEMATICS (CALCULUS - II)

Theory: 4 Credits (60 Hours)   **Tutorial: 2 Credits (30 Hours)**

Objectives: The aim of this course is to prepare the students for the following.

1) To study and understand the notions of calculus and to imbibe the acquaintance for using the   techniques in other sciences and engineering.
2) To prepare the students for taking up advanced courses of mathematics.
3) To apply differential equations to physical and real time problems.

Note: The external paper will be for first 4 units and internal assessment for tutorials (5th and 6th unit).

UNIT − I

Integration of irrational functions, reduction formulae: $\int \sin^n x\, dx$, $\int \cos^n x\, dx$, $\int \sin^n x\, \cos^n x\, dx$, $\int x^m (a + bx^n)^p\, dx$, $\int x^m \cos^n x\, dx$, $\int \sin^m x \sin^n x\, dx$, $\int \cos^m x \cos^n x\, dx$.

UNIT − II

Definite integral and their properties, Integrals of the type $\int_0^n \dfrac{dx}{ax + bx^2}$, $\int_a^b \dfrac{1}{(b-x)^n}\, dx$, $\int_0^1 \log x\, dx$,

$\int_0^{\frac{\pi}{2}} \log(\sin x)\, dx$, $\int_1^\infty x^2 e^{-x} dx$, $\int_e^\infty \dfrac{dx}{x(\log x)^n}$. Beta and Gamma functions and their properties,

Relation between beta and gamma function.

UNIT − III

Differential equations, Integrating factors, Bernoulli's equation, Exact differential equation, Necessary and sufficient condition for exactness, Differential equations reducible to exact form. Symbolic Operators: Linear differential equations with constant coefficients.

UNIT – IV

First order and higher degree differential equations, solvable for *x, y, z, p*, Equations from which one variable is explicitly absent, Clairut's form, equations reducible to Clairut's form.

Tutorial: 2 Credits

UNIT-V

Problems on definite integrals, Beta and Gamma functions, Rectification: arc length of a curve-simple problems, Area bounded by two curves- simple problems.

UNIT – VI

Miscellaneous problems on differential equations, applications of differential equations to problems like population growth, radioactive decay, orthogonal trajectories, RLC circuits.

Recommended Books

1. Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand
2. Schaums outline of Theory and problems of Differential and Integral Calculus.
3. S. D. Chopra and M. L. Kochar, Integral Calculus, Kapoor Sons.

Reference Books

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc. 2002.
2. T.M. Apostal, Calculus Vol. I, John Wiley & Sons Inc.
3. S. Balachandra Rao and C. K. Shantha, Differential Calculus, New Age Publication.
4. S. Lang, A First Course in Calculus, Springer-Verlag.
5. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
6. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
7. Suggestive digital platforms web links: NPTEL/ SWAYAM/ MOOCS.