



MATH-111 Elementary Mathematics 2(2+0)

Theory

Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of $x^n, e^x, \sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it. Maxima and Minima of the functions of the form $y = f(x)$ (Simple problems based on it).

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Lecture Schedule: Theory

| S. N. | Topic | No. of lectures |
|-------|---|-----------------|
| 1. | Functions, Evaluation of Functions, Operations with functions | 2 |
| 2. | $x^n = a^n$ Limits, continuity, $\lim_{x \rightarrow a} x = a$ | 2 |
| 3. | $\sin x$ Limits $\lim_{n \rightarrow \infty} \frac{1}{n} = 0$ $\lim_{n \rightarrow \infty} \frac{1}{n^2} = 0$ $\lim_{n \rightarrow \infty} \frac{1}{n^3} = 0$ $\lim_{n \rightarrow \infty} \frac{1}{n^k} = 0$ $x^0 = x$ | 2 |
| 4. | Problems on continuity | 1 |
| 5. | Differentiation of $x^n, e^x, \sin x$ & $\cos x$ from first principle | 2 |

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| 6. | differentiation of sum and product of functions | 1 |
| 7. | Quotient Rule, function of functions | 2 |
| 8. | Differentiation of function of functions, Parametric Equation | 1 |
| 9. | Logarithmic differentiation | 1 |
| 10. | Differentiation of Inverse Trigonometric functions | 1 |
| 11. | Successive differentiation, Maxima and minima | 2 |
| 12. | Integration Formulae | 1 |
| 13. | Integration by Substitution | 2 |
| 14. | Integration by Parts | 2 |
| 15. | Definite Integration | 1 |
| 16. | Area under curves | 2 |
| 17. | Matrices, Matrix Addition, equality of matrices, square matrix, identity, null matrix | 2 |
| 18. | Subtraction, Scalar Multiplication, Matrix Multiplication, Transpose of a Matrix | 2 |
| 19. | Determinants | 1 |
| 20. | Inverse up to 3rd order | 2 |

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