EMAT101L - Engineering Calculus

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Department of Mathematics
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COURSE CONTENT

- Real Number System, Archimedean Property, Convergence of a Sequence, Monotone Sequences, Cauchy Criterion, Bolzano-Weierstrass Theorem, Limit inferior and Limit Superior.
- Infinite Series, Convergence Tests and Alternating series.
- Limit, Continuity, Existence of Maxima, Intermediate Value Property.
- Differentiability, Rolle's Theorem, Mean Value Theorem.
- Convexity, Concavity, L'Hospital Rule, Fixed Point Iteration Method, Taylor's Theorem, Taylor Series, Power Series.
- Riemann Integration, Fundamental Theorems of Calculus, Riemann Sum.
- Improper Integrals, Beta-Gamma Functions, Differentiation under integration.

- Area between two curves; Polar Coordinates, Volumes by slicing, Washer and Shell Methods, Length of a plane curve, Areas of Surfaces of Revolution.
- Review of vectors, Calculus of Vector Valued Functions, Functions of Several Variables: limit, Continuity and Differentiability, Chain Rule, Directional Derivative, Gradient.
- Mixed Derivative Theorem, MVT, Extended MVT, Taylor's Theorem in Multiple Variables, Hessian, Maxima, Minima, Second Derivative Test, Lagrange Multiplier Method.
- Double Integrals, Change of Variable in a Double and Triple Integrals, Area of a Parametric Surface and surface integral.
- Surface Area, Surface Integrals, Line Integrals Green's Theorem and Applications.

Texts

1. Maurice D. Weir and Joel Hass, *Thomas' Calculus*, 12th Edition, Pearson Education India, 2016.
2. K. A. Ross, *Elementary Analysis: The Theory of Calculus*, 2nd Edition, Springer, 2013.

References

1. S. R. Ghorpade and B. V. Limaye, *An Introduction to Calculus and Real Analysis*, Springer India, 2006.
2. James Stewart, *Calculus*, 7th Edition, Brooks Cole Cengage Learning, 2012.
3. Bartle and Shebert, *Introduction to Real Analysis*, 4th Edition, Wiley, 2014.
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10th edition, Wiley, 2010.

Evaluation policy of the course

- Project/Assignment: 5%+5%=10%
- Online Quizzes: 5%+5%=10%
- Quizzes: 10%+10%=20%
- Mid Term: 30%
- End Term: 30%