

AE675/AE675A INTRODUCTION TO FINITE ELEMENT METHODS

L-T-P-D: 3-0-0-0 Units: 4
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Discussion on mathematical models, reliability of computer aided engineering analysis. Model problem of linear elastostatics in one-dimension, principle of minimum potential energy, beam bending problem. Finite element discretisation in one dimension. One- dimensional h/p code, finite element formulation and development of two-dimensional code. Convergence analysis in two dimensions. Characterization of solution smoothness, rate of convergence in energy norm, a posteriori error estimation. Direct computation of stresses and strains, post-processing, super-convergent extraction techniques.

References:

1. An Introduction to the Finite Element Method, JN Reddy, Tata McGraw-Hill Publishing Company Limited, Delhi.
2. Finite Element Analysis, B Szabó and I Babuška, John Wiley & Sons, Inc, New York.
3. Finite Element Procedures, KJ Bathe, Prentice Hall, 1996.
4. Concepts and Applications of Finite Element Analysis. RD Cook, DS Malkus, ME Plesha and RJ Witt.
5. Finite Element Analysis: Theory and Practice, CS Krishnamoorthy, McGraw Hill Inc., 1994.
6. Introduction to Finite Elements in Engineering, TR Chandrupatla and AD Belegundu, Second Edition, Prentice-Hall, 1997.
7. Finite Element Method: Its Basis and Fundamentals, OC Zienkiewicz, RL Taylor and JZ Zhu.

Examination weightage:

Mid-semester Examination: 30%
End-semester Examination: 40%
Computer coding, report writing, oral and quizzes: 30%

Important Note regarding Computer Coding, etc.: There will be three generic finite element codes to be written in any suitable programming language. The students should submit the report by given due date. An oral examination will be held for all the codes/reports. The students have to run the codes and reproduce the results in the reports.

In case of cheating, all involved will not get any marks for the codes, etc.

Grading Policy: Minimum 40% for passing the course. Relative grading after that.

Attendance Policy: Attendance is compulsory and will be monitored regularly. There is no weightage for attendance towards final grading. If the attendance is below certain minimum, then instructor reserves the right to de-register student(s) from this course.