

ME 756: Numerical Modeling of Manufacturing Processes

Schedule: Autumn Semester

Credit: 6 (3-0-0)

Slot-5 (Wednesday and Friday: 0930 AM to 1055 AM)

Venue: VMCC-33

SYLLABUS

REVIEW of manufacturing processes - casting, forming, welding, and machining. INFLUENCE of process variables on manufacturing processes, need for quantitative understanding of the influence of process parameters on responses, role of computer based numerical simulation / modeling.

FUNDAMENTAL of Finite Element Method (FEM), Elastic Stress Analysis, Heat Transfer and Thermal Stress Analyses, Weighted Residue Technique, Material non-linearity, Elastoplastic stress analysis, Fluid Flow.

APPLICATION of FEM with respect to the problem types (thermal, solid or fluid), Basic Approach to Modeling of Manufacturing Processes (Welding, Casting, Forming, etc.).

Use of FEM on sample problems.

APPLICATION of other numerical techniques on manufacturing process simulation (if time permits).

ASSESSMENT PLAN

Quiz & Assignment: 50% [*these will include computer-based programming assignment which would have to be done and shown in the class only*]; End Semester Exam: 50%

Quiz & Assignment dates: 09.08; 23.08; 06.09; 04.10; 18.10; 01.11 [*Five best marks will be considered for each; No compensation / repeat quiz/assignment will be offered*]

TEXTS / REFERENCES

- S Kalpakjian, Manufacturing processes for engineering materials, 3rd Edition, Addison Wesley Longman, 1997.
- J Schey, Introduction to Manufacturing processes, 3rd Edition, Tata McGraw Hill, 2000.
- O P Gupta, Finite and Boundary Element Methods in Engineering, 1st Edition, Oxford & IBH Publishing, 1999.
- R D Cook, D S Malkus and M E Plesha, Concepts and Application of Finite Element Analysis, Wiley, 2000.
- O C Zienkiewicz, The Finite Element Method, 4th Edition, Tata McGraw Hill, 1991.
- S S Rao, The Finite Element Methods in Engineering, 4th Edition, Butterworth-Heinemann Publication, 2006.
- K J Bathe, Finite Element Procedures, Prentice Hall, 2nd Edition, 1996.

Study materials will be provided / posted in moodle. Slides will not be posted.