Instruction Division
First Semester 2015-2016
Course Handout (Part-II)

Date:03/08/2015

In addition to Part I (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No.	: **ME G641 / CE G641**
Course Title	: **Theory of Elasticity & Plasticity**
Instructor-in-Charge	: **Sharad Shrivastava**

1. Course Description: This course is about the methods to calculate stresses and strains in solids pertaining to various boundary conditions and has wide ranging application in design of machine elements, civil engineering structures and forms the basis for many advanced subjects such as contact mechanics, theory of plates and shells, fracture mechanics.

2. Scope & Objective: The course is for higher degree students to prepare them in applying the theory on some problems of practical and design interest. The students will be able to appreciate underlying meaning of material and structural behavior under complex loading conditions. Students are encouraged to do assignments involving numerical codes to solve problems of elasticity and plasticity and compare with the analytic solutions.

3. Text Books:

T1 Timoshenko S. P. & Goodier J. N., *Theory of Elasticity,* 3rd Edition, Mc-Graw Hill, 1982.

T2 J. Chakrabarty, *Theory of Plasticity*, Mc-Graw Hill Book Company, Singapore, 1987.

4. Reference Books:

R1 Mechanical Metallurgy, George E. Dieter, Mc-Graw Hill Book Company.

R2 M. Filonenko-Borodich, *Theory of Elasticity*, Foreign Language Publishing House, Moscow.

R3 PDS Varma, *Theory of Elasticity*, Vikas Publishing House Private Limited, New Delhi, 1997.

R4 Alexander Mendelson *Plasticity-Theory & application*, The Macmillan Company, New York, 1968.

R5 Martin H Sadd, Elasticity: Theory, Applications and Numerics, Elsevier Butterworth–Heinemann, New York.

R6. Plasticity Theory, J. Lubliner, Dover Publications.

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5. Course Plan:

Lec. No. (s)	Learning Objectives	Topics to be covered	Reference * Chap./Sec. # (Book)
1-3	Introduction to Theory of Elasticity & Plasticity	Analysis of stress and strain, stress-strain relationships, Stress invariants, principle stresses, Equilibrium equations, compatibility conditions, stress function, 2D problems.	Ch 1-2 T1, R1
3-13	2-D elasticity problems in Rectangular coordinates	Bending of beams, Solutions with Fourier series	Ch 3 T1
14-21	2-D elasticity problems in Polar Coordinates	Pure bending, Rotating Disk, Edge dislocation, Stress concentration around a circular hole.	Ch 4 T1
22-24	2-D elasticity Problems in curvilinear coordinates	Complex analysis, Curvilinear coordinates, stress concentration around elliptical holes and notches.	Ch 6 T1
31-34	Physics of Plasticity	Constitutive relations, Problems contained plastic deformation, True stress-strain curve, strain rate effects, idealization, Yield criteria, plastic stress-strain relations	Ch 2-5 of T2, R3
35-42	Steady state problems in plane strain	Symmetrical extrusion, Unsymmetrical extrusion, multi-hole extrusion, Sheet drawing, Cold rolling, mechanics of hot rolling	Ch 7 and 8 R3

6. Evaluation Scheme:

EC No.	Evaluation Component	Duration (min)	Weightage (%)	Date , Time & Venue	Nature of Component
1.	Mid Semester Exam	90	30	8/10 4:00 - 5:30 PM	Closed Book
2	Assignments/Projects		20		Assignment/ Project
3	Comprehensive Exam	180	50	9/12 AN	Open Book

7. Chamber Consultation Hour: Room No. 2146-N. Time will be announced later on.
8. Notices: will be displayed in ME Dept. notice board.
9. Make-up Policy: No makeup for assignment. Makeup for Tests needs prior permission.

Instructor-in-charge

ME G641 / CE G641