

Tanta University

Faculty of Engineering

Production Engineering & Design Dept.

1st Year Mechanical 2012/2013

Strength & Material

Testing

Time allowed: 3 H

Final Grade: 90M

Final Exam

Solve all the following questions:

(1) - a) - Discuss the effect of the following factors on the tensile mechanical properties of steel:

Heat treatment - Alloying - Mechanical working

b) - A tension test is performed on metal (A) with a circular-section with 1.2 cm diameter. The percent elongation for 6.0 cm & 12 cm gauge length were 34% & 30% respectively. Another tension test is performed on metal (B) with 1.2 cm diameter. The percent elongation for 4.8 cm was 39%. Which metal (A) or (B) is more ductile.

c) - A tension test is carried on Aluminium specimen with 1.0 cm diameter and 5.0 cm gauge length. The loads and elongations were as following:

load Kgs	0	200	400	600	800	900	1000	1100	1150
Elong. mm	0	0.018	0.036	0.054	0.072	0.083	0.105	0.160	0.270

Draw the load-deformation diagram and the determine 0.2% proof stress - modulus of elasticity - modulus of resilience - modulus of toughness.

(2) - a) - Discuss and calculate the effect of grain volume of materials on the failure of materials in compression

b) - Explain one of mechanical strain gauges.

c) - A Flexural beam test is carried on a specimen with $\frac{1}{2}$ inch width and $1\frac{1}{8}$ inch depth and 8.0 inch span. The load was in mid-span load. Load P

