

Menoufiya University
Faculty of Engineering
Shebin El- Kom
First Semester Exam.
Academic Year 2013-2014



Department: Mechanical Prod. Eng.
Year: 4th Production
Subject / Code: Welding Tech. /415C
Time Allowed: 3 hrs
Date:16/01/2014

Allowed Tables and Charts (None)

This exam. Measures ILOS no. (a1, a12, b7, c4, d3.....)

Total Mark

(70 Marks)

Answer all the following Questions

Note: Any data required, but not given, may be reasonably assumed.

Question1

(10 Mark)

A) Calculate the carbon equivalent using Saferian's formula for AISI 4340 steel with the composition 0.4%C, 1%Ni, 0.5Cr and 0.2Mo. Suggest the preheating procedure for plates of 25 mm thickness.

B) Discuss the specific effects of the following elements on the structure and properties of weld metal in steel:

- 1) oxygen 2) sulphur 3) hydrogen 4) Nitrogen

Question2

(20 Mark)

A) Calculate the peak temperature attained by steel plates 6mm thickness at a distance of 3mm from fusion zone, while welding at 30V, 300 amps with a speed of 5 mm/s. Then calculate the width of HAZ and the cooling rate at a temperature of 550°C. Assume any missing data.

B) Define the following terms:

- 1- weld dilution and recovery 2- duty cycle 3- deposition rate
4- arc Blow 5- weld decay 6- operating factor

C) Describe the nature, causes and remedies for the following welding defects:

Under bead cracking , Knife-line attack, Centerline cracking

Question3

(20 Mark)

A) Describe briefly (but clearly) the following:

- Underwater welding
- Areas for advanced welding processes
- Plastic bonding
- Welding cost estimate and approaches used to reduce it

B) Discuss with proper reasoning, the processes you would select for welding the following materials:

- 1- Stainless steels 2- Titanium alloys 3- High strength Al alloys

C) With proper reasoning, cite the suitable welding processes for the following industrial applications:

- 1- Railroad rails 2- Hacksaw blades 3- Leads for integrated circuits
4- Honeycomb panels

Question 4

(20 Mark)

Compare with neat sketches between the following welding processes showing their capabilities:-

FCAW	and	SAW
EGW	and	ESW
LBW	and	EBW
USW	and	HFRW
SW	and	EXW

Best wishes