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| Mansoura University       | Final Exam<br>Fine Measurements | Fourth Year Production                                   |
| Faculty of Engineering    |                                 | Full Mark : 70, Time : 3 Hours                           |
| Prod.& Mech. Design Dept. |                                 | 2 <sup>nd</sup> semester, 12 <sup>th</sup> of June, 2012 |

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**Answer all questions, with neat sketches whenever possible**

**Question (1):** (12 Marks):

1. *What is meant by Roughness?*
2. *What are the factors which affect the Surface Finish.*
3. *What are the main types of Roughness Parameters?*
4. *Why Roundness is important?*

**Question (2):** (8 Marks) Discuss in brief the following :

1. *Causes of Surface Irregularities.*
2. *Causes of Out-of-Roundness.*

**Question (3):** (15 Marks) Compare between the following :

1. *Contact methods and Non-contact methods of surface roughness measurements.*
2. *Main types of Roundness Parameters.*
3. *Rotating Pick-up and Turn Table in Roundness Testing Instruments.*

**Question (4):** (10 Marks)

1. *Show how to measure /calculate Tooth Thickness (W), and Tooth Depth (h) of an Involute Spur Gear at the pitch line.*
2. *Illustrate the principles of testing the Involute Form of a Spur Gear.*

**Question (5):** (10 Marks)

*Discuss in general the purpose, functions, and applications of the following Instruments:*

1. *Interference Microscope.*
2. *Coordinate Measuring Machine.*

**Question (6):** (15 Marks)

1. *What are in general the advantages, specifications, and configurations of CMM.*
2. *Compare between two different type of CMM machines in details.*

Best Wishes  
Dr. Ahmed Galal