بــــم الله الــرحمـــــن الــرحيـــم

Mansoura University
Faculty of Engineering
Prod. Eng. & Mech. Design Dept.
3rd Year Production

Course: Machine Tool Design 1
Code: PRE5312 & PRE5322
Time: 4 hr
Date: 15-6-2013

Very Neat Drawings are Essential. Answer all questions

Question 1:   41 Marks
a) Explain with drawing:
  1) Types of speed change mechanisms.   7.5
  2) Types of the frame for machine tools.   7
  3) Materials and optimum shape of the machine tool frame.   8
  4) Different types of ribbing systems of the lathe bed and optimal lacing angle for the lathe bed.   11.5
b) Drive the formula for the spindle nose deflection.   7

Question 2:   89 Marks
The following specifications are given for The ***Radial Drilling Machine:***
  - Motor power   **6 HP**
  - Motor speed   **2800 rpm**
  - Maximum cutting velocity   **65 m/min**
  - Minimum cutting velocity   **25 m/min**
  - Maximum diameter of the twist drill   **30 mm**
  - Minimum diameter of the twist drill   **5 mm**
  - Number of speeds available to the main spindle   **9 (nine) speeds**

You are required to:
1) Draw the structural diagrams for the speed gear box and show how to select the optimum one.   6
2) Draw the speed flow chart for the speed gear box.   8
3) Calculate the number of teeth and diameter for each gear in the speed gear box. Assume module of the gear is *4 mm*, minimum number of teeth is *18*.   9
4) Draw the ***layout*** of the speed gear box.   16
5) Deduce a complete ***force analysis*** for this machine.   20
6) Draw a complete constructional drawing for the ***main spindle***, showing how to obtain the cutting and feed motions for this machine   30

With our Best wishes
Dr. Ahmed El-Bahloul   Dr. Mohamed Fanni   Dr. Hazem El-Shourbagy