Menoufia University **Faculty of Engineering,Shebin El-Kom** **Prod. Engg& Mech. Design Dept.** **First Semester Examination, 2013-2014** **Date of Exam: 13 / 01 / 2014**	جامعة المنوفية	**Subject: Machining Equipments** **Code: PRE 314** **Year : Third** **Time Allowed: 3 hours** **Total Marks: 90 Marks**

***Answer all the following questions (with the help of net sketches)*:**

Question:1(20 Marks)

1. (a) What is the difference between hobbing and milling as gear cutting processes?Discuss their fields of application.*(3 Marks)*

(b) What are the advantages of gear generation by shaping?*(3 Marks)*

(c) Why a heat treatment process is not recommended after gear burnishing?*(3 Marks)*

(d) Draw a sketch to illustrate the principle of gear lapping operation.*(3 Marks)*

2. It is required to manufacturing a helical gear having 36 teeth, helix angle 30^0, addendum (*h*a)3.4641 mm. and the lead screw pitch of the milling machine table is 6 mm.
where: circle of holes in standard index plates:-
I: 15,16,17,18,19,20 & II: 21,23,27,29,31,33 &III: 37,39,41,43,47,49
Changing gears:17,18,19,20,22,24,26,28,32,36,40,44,48,56,64,72,86,100,127
`and(80,48,96).*(8 Marks)*

Question:2(25 Marks)

1. (a) What are the conditions for which are used self-piloting tools?*(4 Marks)*
(b) Explain with the sketches the self-piloting drill classification?*(5 Marks)*
2. (a) What are the variables affecting the performance of honing process?*(4 Marks)*
(b) Compare between honing and super-finishing processes.*(4 Marks)*
3. (a) What are the variables affecting the performance of lapping process?*(4 Marks)*
(b) Explain with sketchesthe lapping machines of spherical surfaces?*(4 Marks)*

Question: 3 ***(22 Marks)***

a)Why has electric-discharge machining become so widely used?*(5 Marks)*

b) Explain why the CO_2 laser is particularly effective for machining non-metals.(5 Marks)

c) Draw neat sketches to show three different flushing techniques used in EDM What type do you prefer and why?*(5 Marks)*

d) In an ECM process under the following condition:
Current density = 50 A/cm^2, length of flow path = 102 mm, specific conductivity = 0.21 Ω^{-1} cm^{-1}, specific density = 1.1 g/cm^3, specific viscosity = 4.18 $Jg^{-1}{}^{\circ}C^{-1}$. Suppose that ΔT must be kept to 50°C, the inlet temperature being 25°C. Calculate the velocity of electrolyte to avoid boiling at the exit.*(8 Marks)*

Question: 4 ***(23 Marks)***

a) Explain briefly the principle of ECUSM (ECU).*(5 Marks)*

b) What are the functions of an electrolyte? What factors need to be considered while selecting it? Discuss the advantages and limitations of some electrolytes.*(5 Marks)*

c) What is the "self-adjusting feature" in ECM?*(5 Marks)*

d) A Nimonic alloy of density 7.85 gm/cm^3 is machined electrochemically using NaCl (eiectrolyte conductivity χ = 0.2 $\Omega^{-1}.cm^{-1}$) to remove a stock of 200 grams. If 200 Amp current and 15V, ($\Delta V = 0$) were used that causes current density of 80 A/cm^2 Calculate the equilibrium gap, and the equilibrium feed rate required. *(8 Marks)*

With our best wishes

Prof. Dr / Taha Ali El-Taweel
Dr. Ali Abdelkawy El-Masry

This exam measures the following ILOs											
Question No.	Q1-1-a Q3a, Q4-b	Q2-1-b Q4-a	Q2-2-b Q3-b	Q1-1-c Q3-d	Q1-2 Q4-c	Q2-1-a	Q2-2-a Q4-d	Q1-1-b Q3-c	Q1-1-d	Q2-3-a	Q2-3-b
Skills	a1-2	a1-1	a19-1	b13-1	b2-1	b18-1	b12-1	c19-1	c13-1	c18-1	c16-1
	Knowledge & Understanding Skills			Intellectual skills				Professional Skills			