Menofia University		Subject: Theoretical Basics of
Faculty of Engineering Shibin El-kom		Fluid Dynamics.
Basic Engineering Sci. Department.		Code: BES 514
2nd semester Examination, 2016-2017	Minoufia University	Year : Master (Grade 500)
Date of Exam : 3 / 6 / 2017		Time Allowed : **3** hrs
		Total Marks: 100 Marks

Answer the following questions

Question 1 (**30 marks**)

Write short notes on :

1. Continuum Hypothesis.
2. Rotational and irrotational flow
3. Mean free path.
4. Classifications of flow phenomena.
5. Geometric and Dynamic similarity.
6. Characteristic parameters of Boundary layer.

Question 2 (**20 marks**)

(A) Prove that the angular velocity of flow segment about z-axis equal:

$$W_z = \frac{1}{2}\left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y}\right)$$

(B) Determine the stream function and potential function for uniform flow in three cases *(i)* The flow parallel to x-direction *(ii)* The flow parallel to y-direction *(iii)* The flow inclined on x-direction with an angel θ.

Question 3 (**20 marks**)

A) If the stream function of an ideal flow equal *2axy*, compute the related potent[ia]l function and graph the potential function and show the stagnation point on it.

B) For a line source and sink in potential flow, compare between the potential a[nd] stream functions.

Question 4 (**30 marks**)

A) By using the superposition between a uniform flow and a line source determine the equation of the resultant shape and estimate the following:
i) Stagnation point   ii) contour equation   iii) Maximum half thickness.

B) For Cartesian coordinates, Write the equations of continuity, momentum equations in three dimensions for unsteady flow of incompressible fluid.

C) Describe the flow of incompressible fluid between two parallel plates such that one of the two plates is in moving and another one is stationary. Show your answer with graph.

This exam measures the following ILOs										
Question Number	Q1-1	Q1-2	Q1-3	Q1-4	Q3-1,2,3	Q4-1,2,3			Q2-a	Q2-b
Skills	Q1-5									
	Knowledge &understanding skills				Intellectual Skills				Professional Skills	

With my best wishes
Associate Prof. Dr. Islam M. Eldesoky