

Menoufia University
 Faculty of Engineering
 Shebien El-kom
 Academic Year : 2016-2017
 Department : Basic Eng. Sci.
 Grade : 700 (Ph.D)



Subject : Magneto Hydro
 Dynamics MHD
 Time Allowed : 3 hours
 Date : 31 / 5 / 2017
 Max Marks: 100
 Code: BES709

Answer all the following questions:

Question 1 (30 marks)

- (A) What's Magneto hydrodynamics MHD?

 (B) There are two different phenomena which deal with MHD, state them?

 (C) Write the Maxwell's equation in integral form and differential form?

Question 2 (20 marks)

- (A) For an incompressible, viscous and electrically conducting fluid, write the complete system of MHD equations?

 (B) Prove that the magnetic induction equation can be derived in the form

$$\frac{\partial \bar{B}}{\partial t} = \nabla \times (\bar{u} \times \bar{B}) + \frac{1}{\mu_0} \nabla^2 \bar{B}$$

Question 3 (20 marks)

- (A) Write the boundary and initial conditions for fluid moving with applied magnetic field on it?

 (B) Write the equations of continuity and Navier-stokes equations for steady viscous incompressible electrically conducting fluid moving between two parallel plates in x-direction taking the effect of MHD into account?

Question 4 (30 marks)

Discuss in details each of the following

- (i) Gauss' Law for electric field. (ii) Gauss' law for magnetic field.
 (iii) Faraday's law. (iv) Ampere's law

This exam measures the following ILOs											
Question Number	Q1-a	Q2-a	Q3-b	Q4	Q2-b		Q1-c		Q1-b	Q3-a	
Skills	Knowledge & understanding skills				Intellectual Skills			Professional Skills			

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