

**FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGERIA
SCHOOL OF ELECTRICAL ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHATRONICS ENGINEERING
SECOND SEMESTER 2018/2019 B.Eng. DEGREE EXAMINATION
COURSE: MCE 220 (Fundamental Mechatronics)**

Instruction: Attempt Any Four (4) Questions of your choice

Time Allowed: 2 Hours.

Question 1 (15marks) [Introduction to Mechatronics]

The newly admitted Students from the other departments are eager to know what Mechatronics Engineering is all about, as it may help them to get acquainted to this vast field of study;

- (a.) Vividly explain to them the need for them to embrace Mechatronics Engineering as a field of study. **(5marks)**
- (b.) Using an appreciative chart or diagram, show the combinational elements of Mechatronics with brief explanation. **(5marks)**
- (c.) What characteristics should a system have to be classified as a Mechatronics System? **(5marks)**

Question 2 (15marks) [Areas of Application of Mechatronics systems]

The farm run by faculty of Agriculture in FUT Minna had a low yield last season due to the lack of constant monitoring and Maintenance of the farm. DOME was approached by the Faculty of Agriculture to design an intelligent farm monitoring system with the following functional features;

- Automated Moisture control and Irrigation System.
- Automatic pesticides and fertilizer administration System.
- Automated Harvesting and Planting System.

Your Task is to:

- (a.) Identify and suggest the components and machines to be used for each of these above-mentioned Systems. **(12marks)**
- (b.) Give six (6) reason why these suggested components and machines would be ideal for the system. **(3marks)**

Question 3 (15marks) [Fundamental Concept of Creativity, Innovation, development and Entrepreneurship in developing Mechatronics based solution in Engineering]

During your study, you were introduced to several mechatronics design concepts, one of the designs is being presented to you for assessment, analysis and confirmation.

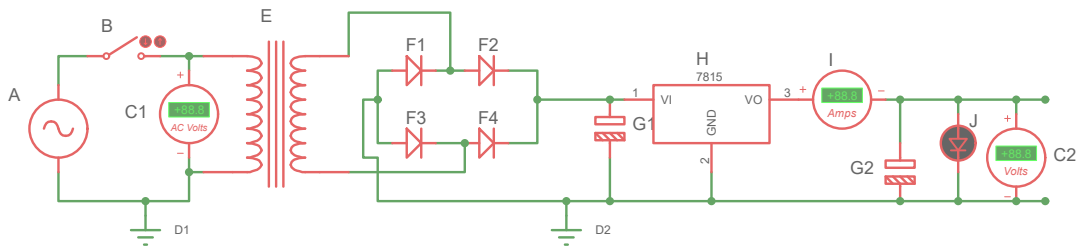


Figure 1: Simple Mechatronics Design Concept

- Give appropriate name to the components designated (A - J). **(10marks)**
- Give the general name for the design in figure 1 with four (4) words. **(2marks)**
- Mention three applications of the design in (b.) within your study environment. **(3marks)**

Question 4 (15marks) [Characteristic advantages and disadvantages of mechatronics systems as compared to non-mechatronics systems.]

There is no doubt that conventional Mechanical, Control, Computer and Electrical Systems have been replaced by Mechatronics Systems. In view of this:

- Itemize five (5) merits of Mechatronics System over non-mechatronics Systems. **(5Marks)**
- Mention at least five (5) Mechatronics systems known to you in your environment. **(5marks)**
- Mechatronics System has its Limitations, enumerate any five (5). **(5marks)**

Question 5 (15marks) [Applications of Mechatronics Systems]

Since the launch of the Modern car in **1886** by the German inventor Karl Benz with his patented Benz Patent-Motorwagen and the mass production of cars by Henry Ford of Ford Motor company in **1908** with his Model T. Modern cars have tremendously evolved over the years to the current era:

- Discuss briefly how the various systems listed below have evolved over the years since The Model T. **(10marks)**
 - Braking System
 - Power Plant (Engine /Motor)
 - Steering
 - Suspension
 - Safety
- With well-arranged block diagrams, show the significant change/development in the Systems listed in (a.) above. **(5marks)**