FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGERIA
SCHOOL OF ELECTRICAL ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHATRONICS ENGINEERING
FIRST SEMESTER 2018/2019 BENG. DEGREE EXAMINATION
COURSE: MCE 326 (Mechatronics System Design I)

INSTRUCTION: Attempt Any Four (4) Questions of your choice TIME ALLOWED: 2 Hours.

Question 1 (15marks) [Introduction to System Design]

The prime objective of studying Mechatronics System Design is to in-build the engineering design virtue among our mechatronics undergraduate, convincingly explain the following as a complete stage in design process: (i.) Model (ii.) Simulation (iii.) Implementation (iv.) Testing (v.) Package. **(15marks)**

Question 2 (15marks) [Mechatronics design Approach: Design Philosophy, Innovation in design, Mechatronic Design Process.]

The Mechatronics system design considers "**Design and Construction of the Vehicles Speed Limits Monitoring and Control System**" for the 18-seater CODel bus in FUT MINNA as a measure to confirm the MCE design capability, developed the design using the following headings:

(a.) Write a seven-paragraph introduction for the topic. **(5marks)**
(b.) Develop a suitable Problem statement for the tittle's topic. **(5marks)**
(c.) Develop the Aim and at least four (4) objectives for the design. (**5marks)**

Question 3 (15marks) [Mechatronics Systems and Engineering design]

Examine critically the Mobile Automatic Fault Diagnose Machine (MAFDM) as a typical Mechatronics system so designed to detect fault in vehicles.

(a.) Create a suitable model for the system with your design concept**(5marks)**
(b.) Develop a flow chat for the system **(5marks)**
(c.) Highlight five basic guidelines is Mechatronic System design proposal preparation **(5marks)**

Question 4 (15marks) [Mechatronics design approach: Design tools including using CAE and simulations software tools.]

Department of Mechatronics Engineering of Federal University of Technology Minna is recently recommended as one of the design outfit for a design competition, enumerate fifteen (15) software that can be used the achieved this task. **(15marks)**

Question 5 (15marks) [Reliability and Safety: MTTF, MTBF, MTTR & System Reliability]

(a.) Define the term Reliability and express the following to shown how reliable is system is:
i.1.00 ii.) 0.91 iii.) 0.75 iv.) 0.01 **(5marks)**
(b.) Discus using appropriate diagram, three basic life stages for Reliability concept using Bath Tub curve.
(c.)
i. Enumerate the three basic categories of system testing. **(3marks)**
ii. Assuming that a mobile automatic diagnosing machine has a probability of successful operation of 0.95 for a single day for safety reason, and it is expected to operate for 6 days (not continuously).
a.) Formulate the probability distribution of the two possible outcomes
b.) Find the possibility that the mobile automatic diagnosing machine will operate successfully for at least 5 days. (**2marks)**