FNU FIJI NATIONAL UNIVERSITY

College of Engineering, Science and Technology
School of Electrical and Electronics Engineering

Bachelor of Engineering (BENG) – Year 2
Electrical and Electronics Engineering

EEE618 - Mechatronics

Semester 2, 2015
(Total Marks: 100 Duration: 3 Hours)

November 2015
Date: As per Time Table Time: As per Time Table
Venue: As per Exam. Schedule

Instructions to candidates:

1) You are allowed 10 minutes extra reading time during which you are NOT allowed to write.
2) Begin each answer on a fresh page and use both sides of the sheet.
3) Write your candidate number at the top of each attached sheet.
4) Insert all written full-scapes, graph paper, drawing paper etc. in their correct sequence and secure with string.
5) For all sheets of paper on which rough/ draft work has been done, cross it through and you must attach all of them to your answer scripts.
6) Write clearly the number(s) of the questions(s) attempted on the top of each sheet.
7) Answer all Questions.
8) There are alternative sub-questions within some questions
9) Start your answer for a new question on new page.
10) Use of mobile phones, smart watches or any other electronic devices with electronic storage of data / communication is NOT ALLOWED during the examination.
11) Use of ONLY non-programmable scientific calculator is ALLOWED.

Total No. of Pages: 03 (Three) including this cover page.

Section A: Short Answer Questions
Total 50 Marks
(All questions in this section are compulsory)

A1: Draw a well-labeled block diagram of a Data-Acquisition-System. **[5 Marks]**

A2: Explain the construction and working of a Slotted –Opto Optical sensor used in rotary/linear motion encoder. **[5 Marks]**

A3: Explain the Fuzzy-Logic based approach in a control system. **[5 Marks]**

A4: Discuss Thermistor and state what is meant by NTC and PTC? **[5 Marks]**

A5: Explain the working of strain gauge sensor with suitable diagram and electrical circuit **[5 Marks]**

A6: Explain how a potentiometer can be used as displacement sensor. Draw the necessary diagram and electrical circuit connections with mathematical equation. **[5 Marks]**

A7: State various light sensors and describe each of them briefly in about 1-2 sentences. **[5 Marks]**

A8: What is meant by Proportional, Integral and Derivative Control techniques? **[5 Marks]**

A9: With a proper diagram, explain the working of hydraulic and pneumatic actuator. **[5 Marks]**

A10: What is piezo-electric effect? Explain the piezo-electric sensor for acceleration measurements. **[5 Marks]**

End of Section A (Short Answer Questions)!

Section B: Long Answer Questions
[Total 50 marks]
(Attempt any FIVE from the following)

B1: Explain the working of an Analog-to-Digital-Conversion (ADC) chip with proper diagram. **[10 Marks]**

B2: Explain the functioning of a Complete Mechatronic System with suitable block diagram. **[10 Marks]**

B3: How a Platinum wire is used as Temperature Sensor in RTD? Explain the working of this type of sensor with proper construction diagram. **[10 Marks]**

B4: State various electromagnetic actuators and explain the working of Relay, Solenoid and Solenoid Valve. **[10 Marks]**

B5: What is LVDT? Explain its working principle with suitable well-labeled diagram. **[10 Marks]**

B6: Explain the various controller options in a mechatronic system **[10 Marks]**

B7: Illustrate with block diagram the working principle of a Robotic Arm with Three-axis movement and a Gripper to hold an object. Assume that this robotic arm is controlled by a PC running with suitable software. **[10 Marks]**

End of Section B (Long Answer Questions)!

***** End of Question Paper *****