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 1, 2018

(Total Marks: 100 Duration: 3 Hours)

Date: As per time table Time: As per time table

Venue: As per exam. Schedule

Instructions to Candidates

1. You will be allowed 10 minutes reading time and **3 hours** to complete this paper.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Please ensure that **your ID number** is written at the top of each sheet of paper used.
4. Insert all written pages, graph paper, drawing paper etc. in their correct sequences 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 numbers of the questions attempted on the top of each sheets.
7. Answer all questions.
8. Use of mobile phones, smart watches or any other electronics devices with electronics storage of data/communication is not allowed during the examination.
9. Use of only non-programmable scientific calculator is allowed.

Total number of pages: 3(three) including this cover page.

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

A1. With neat block diagram explain mechatronics elements system interfacing. [5]

A2. Explain the difference between a microprocessor and a micro controller. [5]

A3. What is the working principle of potentiometer sensors? List any five application of potentiometer sensor in your day to day life. [5]

A4. Write five ideal characteristics of op-amp. [5]

A5. Explain the basic working principle of sensor and transduction. [5]

A6. Differentiate between accuracy and sensitivity of a transducer system. [5]

A7. Define electrical actuator and it's any five industrial applications. [5]

A8. Explain basic operation of a D/A converter. [5]

A9. What is a Thermistor? Explain working principle of negative temperature coefficient and positive temperature coefficient thermistor. [5]

A10. A low pass filter circuit consisting of a resistor of 4k7Ω in series with a capacitor of 47nF is connected across a 10v sinusoidal supply. Calculate the (i) Cutoff frequency (ii) Band width of filter (iii) Frequency response of low pass filter. [5]

Section B: Long Answer Questions
Total 50 Marks
(Attempt any five from the following)

B1. With neat block diagram explain importance of Mechatronics in industrial automation. [10]

B2. What is Mechatronics? Explain the inter connection of various elements in Mechatronics system with block diagram. [10]

B3. (a)With neat sketch explain the working principle of Hall Effect sensor. [5]

Define sensors and its specifications (i) Range (ii) Span (iii) Error (iv) Accuracy (v) Sensitivity (vi) Resolution that need to be carefully studied before using a Thermocouple for reading the temperature of a furnace. [5]

B4. Describe the operation of the elements of a computer-based instrumentation system. [10]

B5. Explain the importance of data conversion devices and its components comparator, encoder and ADC in mechatronics with block diagram. [10]

B6. (a)Write any five applications of Linear Variable Differential Transformer sensors. What kind of primary transducer you require to measurement of linear displacement with an input range of about ± 2 to ± 400 mm. Explain working principle with neat diagram and justify your answer. [5]

(b) Explain major element of general data acquisition system (DAS) with a neat block diagram [5]

The End