



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017**

TERBUKA

COURSE : ELECTRONIC INSTRUMENTS
AND MEASUREMENTS

COURSE CODE : BEF 24002

PROGRAMME : BEV

EXAMINATION DATE : JUNE 2017

DURATION : 2 HOURS AND 30 MINUTES

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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Q1 (a) Choose the correct answer for each question:-

(i) The device that convert from physical parameters into electric signal parameters is called:

- a. Sensor
- b. Amplifier
- c. AC to DC converter
- d. DC to AC converter

(2 marks)

(ii) The smallest detectable incremental change of the input parameter that can be detected by a measurement tool is defined as

- a. Linearity
- b. Precision
- c. Resolution
- d. Range

(2 marks)

(iii) In a measurement characteristic, these parameters are classified as dynamic characteristics except,

- a. rise time
- b. settling time
- c. overshoot
- d. precision

(2 marks)

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(iv) Electrical noise can be divided into several principal sources except

- a. Thermal Noise
- b. Flicker Noise
- c. Interference
- d. PWM

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(2 marks)

(b) A block diagram of a signal conditioning process in an electronic instrumentation measurement is shown in **Figure Q1(b)**. Based on the input-output value of each block, analyze and suggest the operation types just giving name of the process-1 and process-2.

(4 marks)

(c) A temperature sensor with transfer function $20 \text{ mV}/^\circ\text{C}$ has an output resistance of $5 \text{ k}\Omega$. The sensor is connected with an amplifier as shown in **Figure Q1(c)**. Derive and determine the output voltage of the amplifier when the input temperature is 32°C .

(13 marks)

Q2 (a) An analog multirange ammeter circuit is shown in **Figure Q2(a)**. The resistance of the coil is 40Ω and the maximum current in the coil of iron-vane movement is 5 mA . Calculate the value of the resistor for the ammeter.

(5 marks)

(b) Design a block diagram of RMS digital voltage meter that use averaging technique, where $V_{\text{rms}} = k V_{\text{avg}}$.

(11 marks)

(c) (i) List any **two (2)** elements of analog process and any **two (2)** elements of digital process of the digital voltage meter system in **Q2(b)**.

(4 marks)

(d) State **two (2)** advantages and **one (1)** disadvantage of a RMS measurement using averaging technique.

(3 marks)

(e) State **two (2)** methods of true RMS measurement technique.

(2 marks)

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- Q3** (a) State **four (4)** advantages of digital oscilloscope (2 marks)
- (b) (i) Draw the block diagram of a digital oscilloscope and name the principal subsystems of this oscilloscope. (5 marks)
- (ii) Describe the purpose of **three (3)** elements of these subsystems. (6 marks)
- (c) **Figure Q3(c)** is a voltage waveform display of an oscilloscope;
- (i) Determine the frequency (f), Voltage peak-to-peak (V_{p-p}) and V_{RMS} (6 marks)
- (ii) TIME/DIV and VOLTS/DIV in **Figure Q3(c)** is adjusted to 10 ms/DIV and 50 V/DIV respectively. Sketch the waveform generated and discuss the answer given. (6 marks)
- Q4** (a) Differentiate between thermocouple and resistance temperature detector (RTD) (6 marks)
- (b) With the help of a neat diagram, analyze the working principle of resistance temperature detector (RTD). (9 marks)
- (c) (i) Name **two (2)** types of internal noise source (2 marks)
- (ii) Discuss each of them. (8 marks)

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- END OF QUESTIONS -

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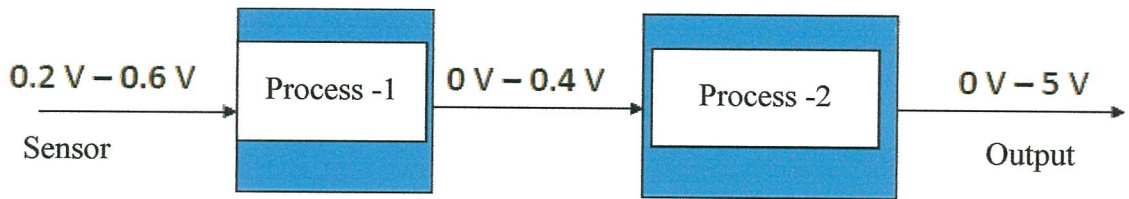


Figure Q1(b)

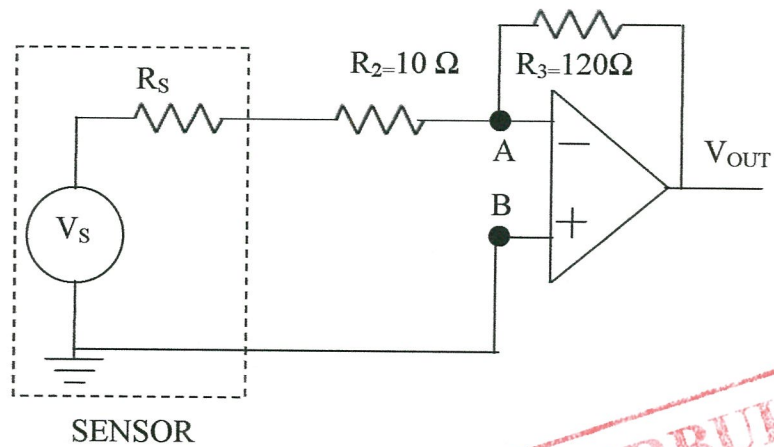


Figure Q1(c)

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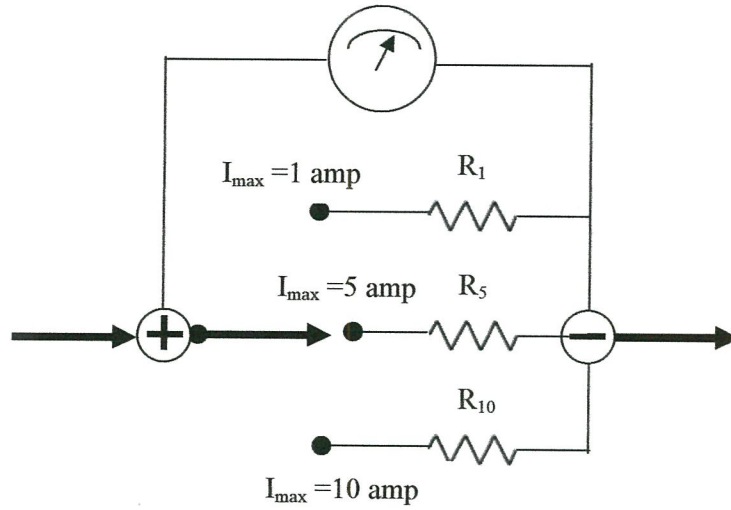


Figure Q2(a)

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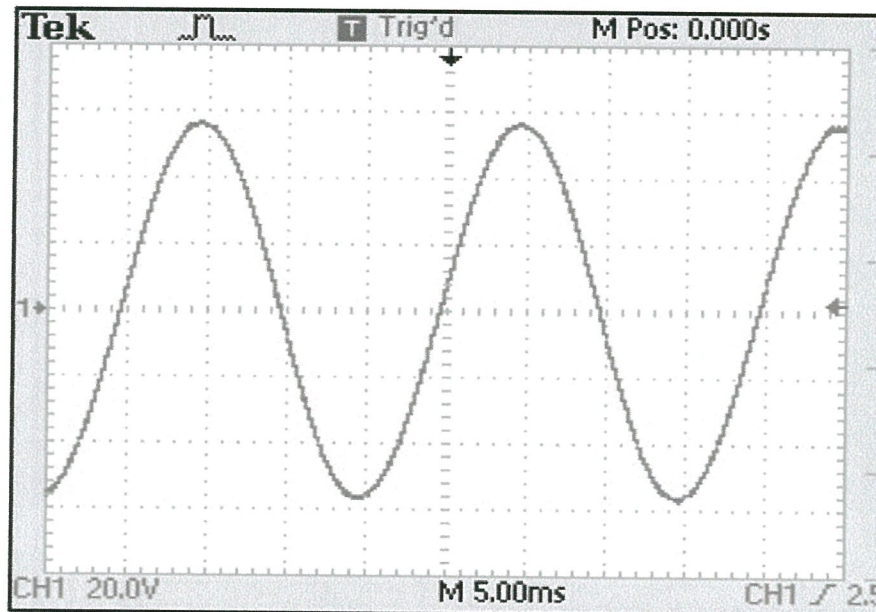


Figure Q3(c)