UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	AUTOMOTIVE ELECTRIC AND ELECTRONIC SYSTEMS
COURSE CODE	:	BNG 20203
PROGRAMME	:	BNG
EXAMINATION DATE	:	JUNE/JULY 2018
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1   (a)   List **FOUR (4)** electrical components commonly used in automotive system.

(2 marks)

(b)   In basic electrical fundamentals, there are **TWO (2)** conditions that enable the flow of electron. Explain both of these conditions.

(2 marks)

(c)   Classify the difference between parallel circuit and series circuit in term of current, resistance and voltage.

(6 marks)

(d)   Analyze **THREE (3)** main factors that influence the amount of resistance offered by a conductor.

(3 marks)

(e)   Explain the purpose of voltage regulator in charging system.

(2 marks)

(f)   Adaptive cruise control can automatically adjust the vehicle speed to the current traffic situation. Analyze **THREE (3)** main objectives of this system.

(5 marks)

Q2   (a)   Explain what is the lazy lock system.

(3 marks)

(b)   Classify **FOUR (4)** main ways to disable the vehicle in view of security system.

(2 marks)

(c)   Automotive safety system may be categorized into two systems that are active safety and passive safety. Distinguish these **TWO (2)** safety system with the examples.

(5 marks)

(d)   Based on your understanding of the lighting system, predict the main objective of reflector in the headlight of vehicle.

(2 marks)

(e)   Almost all vehicles now use tungsten halogen bulbs for the headlights. Point out the reasons why gas in halogen bulbs is mostly iodine and the glass envelope is made from fused silicon or quartz.

(3 marks)

(f)   If the *light do not work* symptom occurs in a vehicle lighting system, analyze **FIVE (5)** possible faults that lead to this symptom.

(5 marks)

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Q3   (a)   Explain the term below:
(i) sensor
(ii) actuator

(2 marks)

(b)   Inductive sensor is used mostly for measuring speed and position of a rotating component and the output voltage of most inductive-type sensors approximates to a sine wave.

(i) Investigate **FOUR (4)** main factors that influence the amplitude of this signal.

(4 marks)

(ii) Commonly, the output signal of inductive sensor will be converted to a useful signal by passing it through Schmitt trigger circuit. Analyze the function of this circuit.

(2 marks)

(c)   Hot wire air flow sensor is used to measure the air mass flow to the combustion chamber.

(i) Demonstrate in details the basic principle of this sensor.

(4 marks)

(ii) Differentiate the difference between hot wire air flow sensor and thin film air flow sensor.

(2 marks)

(d)   Generally, oxygen sensor is placed in the exhaust pipe near to the manifold. Discover the main objective of this sensor.

(2 marks)

(e)   Give **FOUR (4)** examples of actuator that most commonly used in automotive electric and electronic system.

(2 marks)

(f)   Fuel injector is a device that used actuator principle in order to control the fuel quantity injected into the combustion chamber. Demonstrate how the fuel injector operates.

(2 marks)

Q4   (a)   In Motronic M3 system, the ignition and injection control are combined. At the ignition level, discover **THREE (3)** basic criteria that ECU must be able to do.

(3 marks)

(b)   Engine speed and manifold absolute pressure are the basic parameters for ignition advance angle calculation obtained from a memorized cartographic map held in a ROM chip within the ECU. Analyze **THREE (3)** additional input parameters in order to ensure optimum advance angle timing calculation.

(3 marks)

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(c)   Predict **THREE (3)** different basic timing conditions that need to be determined by the ECU for full ignition control in internal combustion engine.

(3 marks)

(d)   Point out **TWO (2)** different operation conditions of anti-jerk in Motronic system.

(4 marks)

(e)   During fuel mixture calculation, ECU will conduct the correction based on air temperature and depending on whether the engine is idling, at full or partial load. Investigate another **FOUR (4)** factor of correction perform by ECU based on engine condition.

(4 marks)

(f)   Classify **THREE (3)** operating modes regulated by ECU in DI-Motronic gasoline engine.

(3 marks)

Q5   (a)   Real time capability is one of the requirements for bus system in automotive application. Discover **FOUR (4)** examples that used this requirement.

(4 marks)

(b)   Based on your understanding, identify **FIVE (5)** advantages of CAN bus system as compared with the conventional wiring system.

(5 marks)

(c)   CAN bus system operate using two different controller area networks, that are high speed CAN and low speed CAN. High speed CAN operates at bit rates of 125kBit/s to 1MBit/s while low speed CAN operates at bit rates of 5 to 125kBit/s. Analyze **THREE (3)** examples of application for each controller area network in current automotive system.

(6 marks)

(d)   (i) Describe "LIN"?

(1 mark)

(ii) Differentiate the differences between LIN and FlexRay network.

(4 marks)

-     **END OF QUESTION** -