



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER III
SESSION 2018/2019**

COURSE NAME : ROBOTICS AND AUTOMATION SYSTEM
COURSE CODE : DAE 32503
PROGRAMME CODE : DAE
EXAMINATION DATE : AUGUST 2019
DURATION : 2 HOURS 30 MINUTES
INSTRUCTION : ANSWERS ALL QUESTIONS.

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THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

PART A

- Q1** The word robot comes from the Czech term robota meaning
A. Mechanical man. C. Forced laborer or serf.
B. Mechatronics. D. Man servant.
- Q2** Which characteristics define a robot?
A. Multifunction ability C. Ability to be programmed
B. Autonomous operation D. All of the above
- Q3** What is the name for the devices that make robotic manipulators move?
A. Manipulator controllers C. Control manipulators
B. Actuator D. Activators
- Q4** Which motor has high torque and precise angular control.
A. Servo motor C. Stepper motor
B. Brushless motor D. Brushed motor
- Q5** Which motor has feedback (closed loop system).
A. Servo motor C. Stepper motor
B. Brushless motor D. Brushed motor
- Q6** Which motor requires Electronic Speed Controller circuit to function
A. Servo motor C. Stepper motor
B. Brushless motor D. Brushed motor
- Q7** PWM are used to control DC motor speed. What are PWM stands for?
A. Pulse Wide Motor C. Pulse width modulation
B. Power Motor D. None above
- Q8** Which motor provide LIMITED rotational movement?
A. Servo motor C. Stepper motor
B. Brushless motor D. Brushed motor
- Q9** Which statement does not true for proximity sensor?
A. Use for short range detection C. Can be used to detect plastic
B. Can be used to detect metal D. Operated based on ultrasonic
- Q10** A linear displacement sensor attached on a linear motion arm has a resolution of 10mm per count. If the sensor moves with a speed of 5cm/s in 3 seconds, how many counts has been read by the sensor?
A. 5 C. 25
B. 15 D. 150

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- Q11** What is the function of copper brushed inside a brushed DC motor?
A. Absorb vibration
B. Convert voltage to current
C. Creating flux
D. None above
- Q12** Information sent from sensor to controller are known as
A. Output
B. signal
C. feedback
D. All above
- Q13** For a limit switch and relays, what is 'NC/NO' stands for?
A. Not connected/Not On
B. Normally closed/Normally open
C. Normally connected/Normally open
D. None above
- Q14** Which of the following is an electro-mechanical sensor
A. Ultrasonic sensor
B. Infrared sensor
C. Limit switch
D. All above
- Q15** A robot that able to stops a certain distance from an object is most likely to employ.....
A. Infrared sensor
B. Limit switch
C. Light sensor (LDR)
D. None above
- Q16** Which among the following is not the functionality of robots?
A. Reprogrammability
B. Multifunctionality
C. Responsibility
D. Efficient Performance
- Q17** Which part of the robot provides motion to the manipulator and end-effectors?
A. Sensor
B. Actuator
C. Controller
D. None of the above
- Q18** Which of the following is not an actuator
A. Digital Actuator
B. Pneumatic Actuator
C. Hydraulic and Electric Actuator
D. None of these
- Q19** Physical structure of robot which moves around, is called
A. Links
B. Joints
C. End-effector
D. Manipulator
- Q20** The kinetic part of the robot or manipulator is called
A. Links
B. Joints
C. End-effector
D. Manipulator

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PART B

- Q21.** (a) Briefly define the Internet of Things (IoT). (3 marks)
- (b) Discuss the concept of IoT architecture in a 'smart factory' with the aid of block diagram. (12 marks)
- Q22.** (a) Explain what are 'forward kinematics' and 'inverse kinematics' You may use diagram for your explanation. (4 marks)
- (b) Differentiate what are 'effectors' and 'manipulators'. Give **one (1)** example of each. (6 marks)
- (c) **Figure Q2(c)** shows an industrial manipulator robot. Based on this figure, answer these questions:
- Identify the Degree of Freedom (DOF) for the robot. (1 mark)
 - Name the component labelled with number **three (3)**. (1 mark)
 - List all numbers that related to the robot links. (2 marks)
 - Identify the type of joint for component labelled with number **six (6)** to actuate the robot. (1 mark)

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- Q23** (a) Automation in general enables the effective and economical operation of both production equipment and processes. Define automation. (1 mark)
- (b) **Figure Q3(b)** shows a basic element of an automated system.
- i. Fill in the empty blocks below. (3 marks)
 - ii. Briefly explain each of the block diagram to support your answer in **Q3 (b)(i)** (1 mark)
- (c) Automated manufacturing systems can be classified into three standard types which are fixed automation, programmable automation and flexible automation. Compare the advantages and disadvantages of the three types of automated manufacturing systems. (10 marks)
- Q24.** (a) One of the issues involving development of robotics is about human employment. Discuss about the “pros and cons” of robotic at workplace. (5 marks)
- (b) Mobile robots are fairly limited to its power source capabilities. Discuss the current development in overcoming this issue. (5 marks)
- (c) Internet-of-things (IoT) offers many advantages and opportunities to improve the way we live. However, there are several challenges that needs to be address, Identify FIVE (5) of this challenges. (5 marks)

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END OF QUESTIONS

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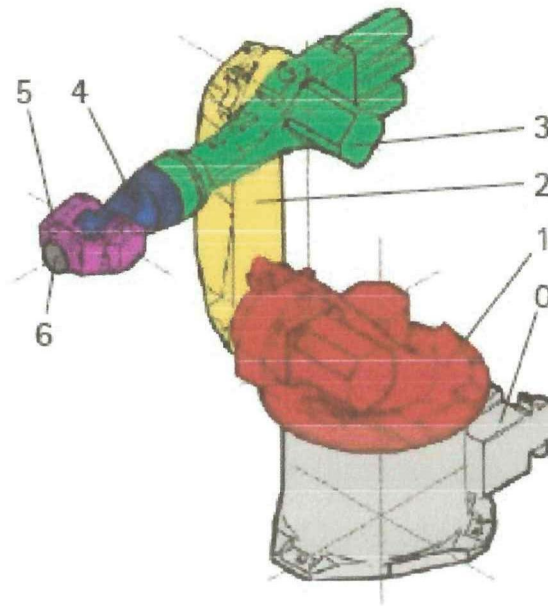


Figure Q2(c)

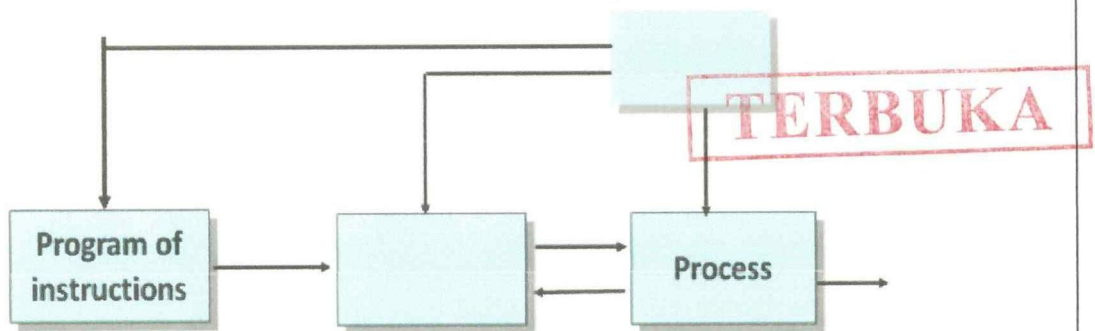


Figure Q3 (b)