



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO413: ROBOTICS

DATE:

TIME:

INSTRUCTIONS

Answer Question ONE and other TWO Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain what you understand by the Robotics. (3 marks)
- b) Describe a robot mechanism. (3 marks)
- c) Differentiate between actuators and a drive Systems as used in Robotics. (4 marks)
- d) Explain the Robot Kinematics and ONE method that can be used to implement it. (4 marks)
- e) Discuss **FOUR** main characteristics of a Robot. (4 marks)
- f) Elaborate on the **THREE** Laws of Robotics as advanced by Asimov(1942). (6 marks)
- g) Discuss TWO main Components of Industrial Robots. (6 marks)

QUESTION TWO (20 MARKS)

- a) By the aid of a diagram, present any **TWO** robot joints used in the Robotics. (6 marks)
- b) State FOUR needs for an Industrial Robots. (4 marks)
- c) Specify TWO categories of robots based on their configuration. (6 marks)

- d) Apart from the path and trajectory, present any other **TWO** types of trajectory planning (4 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the **SIX** degree of freedom for a Robot manipulator. (6 marks)
- b) Illustrate the **TWO** components of the path and trajectory planning. (6 marks)
- c) Sensors are devices that can sense and measure physical properties of the environment. State any **THREE** physical properties that can be measured by the Sensors. (3 marks)
- d) Distinguish the tactile sensing from the touch Sensing as used in Robot. (5 marks)

QUESTION FOUR (20 MARKS)

- a) Describe the Transduction and any **TWO** reasons why it's important in developing a Robot (6 marks)
- b) Represent the joint space of Robots by aid of an algorithm. (4 marks)
- c) Distinguish the torque sensors from the Proximity sensor as used in the Robotics. (6 marks)
- d) State any **FOUR** Programming Languages for Robotics. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the applications of machine vision system in the Robotic. (4 marks)
- b) By aid of a diagram, explain the functions of Machine Vision System in Robotic. (6 marks)
- c) Discuss any **THREE** benefits for robotic vision systems in the industry. (6 marks)
- d) Robot programming can be divided in **TWO** common methods .Describe these methods (4 marks)