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)