EE520 – Test1 – 2023-2024 Sem 2 – Time Allowed 1 hr 15 min

25% for each question

Question 1

Fig. Q1 shows the robot for the pick and place of delicate objects (e.g., an egg) from the egg casket to a bowl. This pick and place operation needs to be done as fast as possible. Use a flow chart to describe one complete pick and place motion cycle. Assume that the robot has a gripper axis, an up/down Z axis, and a 2-dimensional X-Y axes.

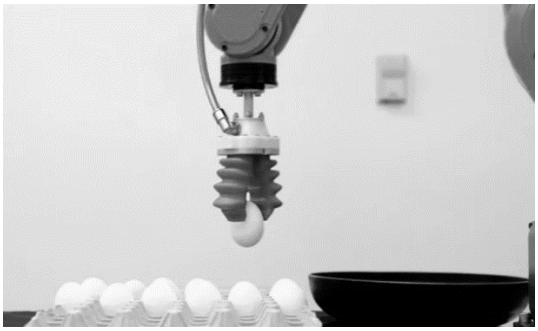

Fig. Q1

Question 2

Explain how you could obtain the position and speed of the motion, by using the phase A, phase B, and the index signals from the linear encoder, through quadrature decoding.

Question 3

By examining the structures of the motors, explain why a dc brush-type motor is not suitable for high speed high precision motion control, but a permanent magnet brushless dc motor is most suitable.

Question 4

Explain how the mechanical resonant problem of a stepping motor will affect its low-speed motion performance. Also, explain why this poor low-speed motion performance will affect the low-speed drawing capability of 2 dimensional plotters based on stepper motors.

Name:_____ Student Number: _____

Answer on BOTH sides of this paper.

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Answer on BOTH sides of this paper.