Mechatronics Part 2 Study Guide

Fluid power

- Be able to draw and identify Pneumatic symbols.
- List 3 Symptoms of a machine with air trapped in the hydraulic system. List 3 places the air might be trapped when starting a new system. Write a work plan on how you would service the machine to remove the trapped air.
- A Cylinder is defined as 120/60 - 1500 what does that mean? If it needs to extend at v=0.2 m/s how much fluid must the pump be able to produce?
- When servicing a hydraulic system what safety measures must be taken.
- What is the difference between flow control vs throttle control?
- What are the advantages and disadvantages of Meter in and Meter out when controlling a cylinder?
- Draw a pneumatic and hydraulic diagram using the symbols on page 420 Blue book using Valves, Motors, cylinders, sensors, and directional flow indicators.

Mechanical

- When selecting the correct Bolt for a rugged application what factors should you consider when considering the different bolt material types.
- A bolt is defined as M12 X 1.75. What does each Pitch of screw what does each number or letter mean?
- There are multiple different types of gear boxes with different benefits. Name as many as you can and identify each's strengths and downfalls. Example: Spur Gear Box, V-belt Gear box, etc.…
- Be able to look at a Gear box assembly drawing and correctly identify what parts need to be removed and in what order.
- Be able to walk through a gear box and correctly identify the output vs input rotation.
- List 5 different types of bearings. For each bearing draw the direction that you can apply a load without damaging the bearing.
- List 5 ways to clamp a pully to a shaft.
- What type of taper is used on a traditional Knee mill collet?
- Identify the different welding methods and the different seams.
- Calculate the sheer force of a M12 bolt in single and double sheer.
- What is the difference between Clearance Fit, Transition Fit, and Interference Fit?
- What does a H8 mean? What does r6, m6, g6 mean?
- What are the advantages and disadvantages of installing bearings using heating and cooling?
- What is a torque wrench? How do you calculate the torque you are applying to a bolt using a long wrench without using a torque wrench?
- You have a two ended lever 2m long with a pivot 0.75m from one end. The shorter side has a 50N load applied, what load needs to be placed on the other end to balance the lever

Quality

- What is a process control chart? Explain all the control limits and their purpose.
- What is the purpose of the commissioning document?
- What are disturbance variables, controlled variables, manipulated variables and how do they effect an output.

CNC/Robotics

- When programing a CNC or Robot both may use incremental path measurement or Coordinate path measurement. Explain how both work and the advantages and disadvantages of each.
- What is the difference between Preventative Maintenance and Maintenance?
- When selecting lubricants to add to your robot what should you consider doing before starting to work with the fluids.
- If there are any Hazardous chemicals, what special precautions should you take?

Drafting

- You may be asked to draw a part in any of the projection methods or section view.
- Understand the difference between first and third angle how sides a transposed
- What is the correct method for using hash lines to indicate sections?
- What types of standard materials should not be shown in a section view?
- How would a surface finish be called out on a drawing?

Electrical

- Draw a Binary Logic diagram the basic electrical diagram and the truth table. Metal present must not be made, and work piece is in position. If the part is correctly and the operator has pressed the start button the process starts.
- Understand Ohms Law.
- In the event of a ground fault understand and calculate the flow of electricity through the human body.
- Explain how the RCD in your cabinet works.
- What does a rectifier do and what does the wave form look like after the rectifier?
- What is an Astable Trigger, Monostable Trigger, Bistable trigger, Schmitt Trigger?
- Explain the difference between TN-s, TN-c, TN, IT, TT systems.
- Explain the difference between Profibus, profit net, and CAN.
- What is the difference between Inductive, Capacitive, IR, Proxy, Sensors, and Limit switches?
- Draw an electrical diagram using the symbols on page 438 Blue book using coils, lights, motors, and sensors.

Motors

- Apply Ohms law to a 3-phase motor circuit.
- A 3-phase motor is not functioning what trouble shooting would you do? And what do you expect to see?
- What are pole pairs how do you determine how many a motor has?
- A Motor has a name plate attached to it what information would you expect to find on it?
- What is meant by wiring a motor for Star or Delta configuration. What are the advantages and disadvantages of each?
- What would happen to a motor if the motor were allowed to stall during normal operation.
- What is the purpose of the motor starter switch?
- How do you measure loop impedance in a motor?
- List the advantages of a soft start motor circuit.
- How would you wire a frequency inverter for a single-phase motor?