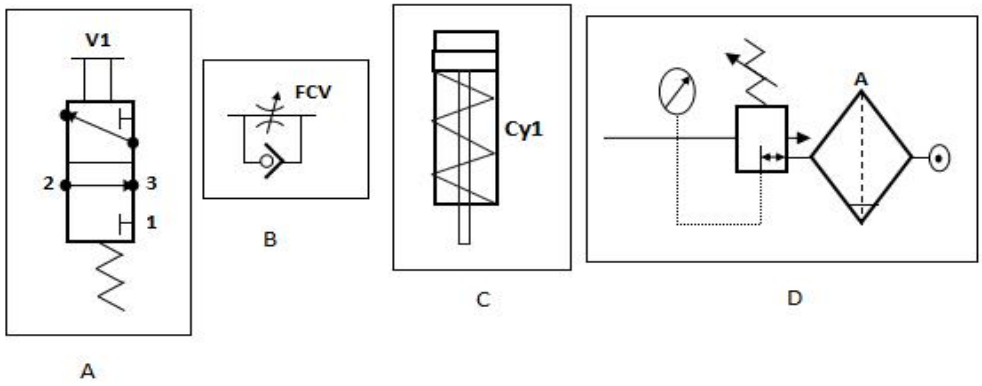
FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGERIA
SCHOOL OF ELECTRICAL ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHATRONICS ENGINEERING
FIRST SEMESTER 2019/2020 B.Eng. DEGREE EXAMINATION
COURSE : MCE 314: Mechatronics Laboratory I
INSTRUCTION: Attempt all questions. All questions carry equal mark.
TIME ALLOWED: 3 Hours

QUESTION ONE



a. With the aid of a schematic diagram above, design a simple pneumatic circuit. **(5marks)**

b. During the practical titled: The operation of a single acting cylinder controlled by 3-Way Valve, list the components needed for these experiment and their functions. **(5marks)**

c. List four application of pneumatic system. **(2marks)**

d. List any three precautionary measures when operating a single acting cylinder controlled by 3-Way Valve. **(3marks)**

QUESTION TWO

a. With an illustrative diagrams, explain the following: **(4marks)**

i. AND operation ii. OR operation

b. Describe how the two electric circuit (OR and AND) conditioning are operated. **(5marks)**

c. Give two examples each were push button and toggle switch should be used.**(2marks)**

d. Define the following CNC CODES : $G_0\,X_{XX}Z_{ZZ}$**;** $G_1X_{XX}Z_{ZZ}F_{FF}$**;** M_4S_{SS}**;** M_5. **(4marks)**

QUESTION THREE

a) List five basic electronic components of a motor speed controller and describe the function of each component. **(8marks)**

b) Briefly explain on the following? **(2marks)**

i. Up milling ii. Down milling

c) What ways can the software that enables one to create and edit a G and M-code file be run? **(2marks)**

c). Highlight three advantages of using a helical milling cutter **(3marks)**

QUESTION FOUR

The figure 2 below shows an hydraulic circuit diagram. If at the end of the experiment the following observations were made:

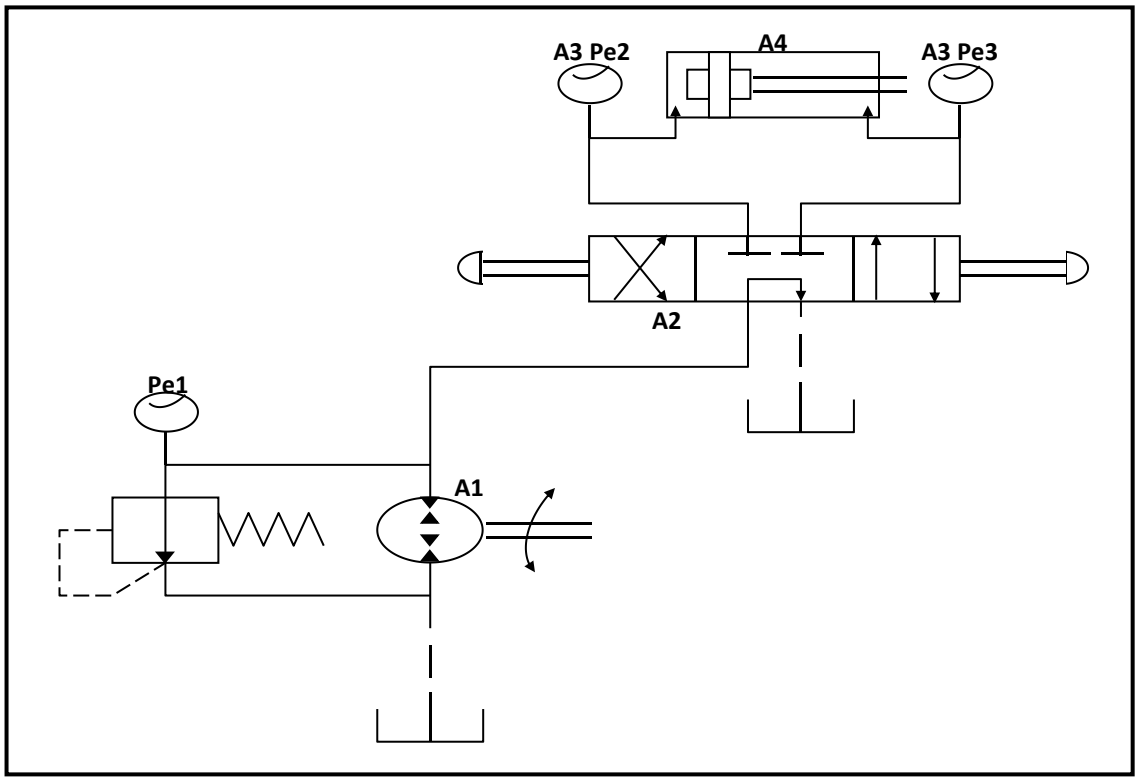


Figure 2

Toggle switch	Pe 2 (bar)	Pe 3 (bar)	Force, F
Handle Normal position	0	0	**0**
Handle raised	40	15	**?**
Handle lowered	20	10	**?**

a. Calculate the force of the piston, applied during its activation and deactivation mode given the diameter of piston equal 40mm. **(8marks)**

b. What is the function of the pressure regulator valve? In hydraulic system. **(2marks)**

c. Explain the following terms as apply to hydraulic training systems: **(5marks)**

i. Actuator **iv**. Adjustable pressure regulating valve

ii. Control valve **v.** Pressure gauge module

iii. Hydraulic accessories