

# DDPJ 3322 PBL ASSIGNMENTS

## 2016/2017 Sem 1

### Pneumatics and Hydraulics

**Purpose:** To introduce the students to the basics of **Pneumatic and Hydraulic Systems**, and to apply the basic principles of these systems into a construction project.

#### **Objectives:**

- A.** To learn the **terminology** and **symbols** related to Pneumatics and Hydraulics.
- B.** To understand how **hydraulic lifts** work by achieving mechanical advantage.
- C.** To **design** a hydraulic / pneumatic system project using a single master cylinder controlling at least two slave cylinders.
- D.** To **build a SIMULATION system** that works hydraulic / pneumatic to solve a problem.

#### **Portfolio Requirements:**

- 1.** A complete list of definitions relating to pneumatics and hydraulics.
- 2.** A list of the symbols involved in simple hydraulics and pneumatics accompanied by drawings of each of the symbols on the list.
- 3.** A drawing of the simple hydraulic system and a brief explanation in your own words about how it works.
- 4.** Drawings of your own created pneumatic system including at least one master cylinder and two slave cylinders. Examples: elevator, sliding doors, dumb waiter.
- 5.** A constructed project based on the designed system in number 6.

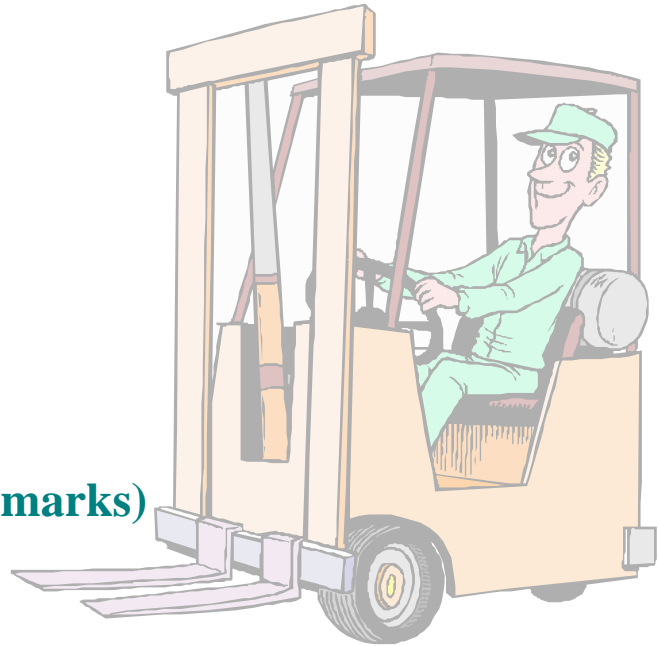
#### **Assignment Outcomes:**

| Item   |   | Marks |
|--------|---|-------|
| Part A | Hydraulics and Pneumatics Definitions               | 10    |
| Part B | Symbols   | 10    |
| Part C | Drawing of Basic Hydraulic Systems                  | 15    |
| Part D | Draw Scaled diagrams of Pneumatic/Hydraulic Project | 30    |
| Part E | Produce a Project Simulation                        | 35    |

## Part A: Definitions: (10 marks)

All definitions can be found on “Fluid Power” book.

1. Pneumatics
2. Hydraulics
3. Compressor
4. Receiver(tank)
5. Spool
6. Sensor
7. Pressure
8. Ports
9. Regulator
10. Time delay



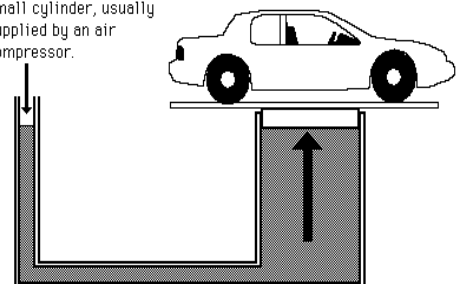
## Part B: Symbols: (10 marks)

1. Pressure Relief Valve
2. Shut off Valve
3. Pressure Regulator
4. Three Port Valve (air)
5. Single Acting Cylinder
6. Blocked Port
7. Air Flow
8. Exhaust
9. Air Supply
10. Hydraulic Pump (Fixed Displacement)

## Part C: Basic Hydraulic Systems (15 marks)

- A. Draw the simple hydraulic system. (Resources from Fluid power by Esposito) (10 marks)
- B. Explain in simple terms the mechanical advantage of a hydraulic system. What is the trade off in this system (you are not getting something for nothing... Why?) (5 marks)

Pressure on fluid in small cylinder, usually supplied by an air compressor.



## Part D: Scaled Diagrams of Project (30 marks)

- Draw scaled diagrams (TOP, FRONT, & SIDE VIEWS) of a pneumatic system using a single master cylinder controlling two or more slave cylinders.
- Create a materials list including the amount of wood you need to construct your project.
- Some examples of projects are:
  - Fabricated of pneumatic mobile crane
  - Fabrication of mini hydraulic hand operated crane
  - Sliding door(s)
  - Dump truck
  - Automatic pneumatic bottle washing machine
  - Coconut or durian peeler
  - Coconut milk press machine
  - Pneumatic can crushing machine
  - Hydraulic bending portable machine (tube steel)
  - Pneumatic multipurpose grinding machine
  - Fabrication motorized hydraulic jack
  - Mini-Baja's hydraulic
- EACH student is required to have his/her own drawings.

## Part E: Construct your Project Simulation (35 marks)

- ❖ After your diagrams have been approved by your lecturer you may begin the construction of your simulation.
- ❖ Remember to keep strength and operation in mind.
- ❖ You need only build one project between the 5 group members.