

**MVM - Hydraulic Pneumatic**

**T065**

**Thursday, 30/10/2014**

**8:30 – 11:30 AM**

**WORKFORCE DEVELOPMENT AUTHORITY**



P.O. BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2014  
TECHNICAL AND PROFESSIONAL TRADES**

**EXAM TITLE: Hydraulic Pneumatic**

**OPTION: Motor Vehicle Mechanics (MVM)**

**DURATION: 3hours**

**INSTRUCTIONS:**

The paper is composed of **three (3) main Sections:**

Section **I:** Fifteen **(15)** questions, all **Compulsory**. **55marks**

Section **II:** Five **(5)** questions, **Choose any Three (3)**. **30marks**

Section **III:** Three **(3)** questions, **Choose any One (1)**. **15marks**

**SECTION I. FIFTEEN (15) COMPULSORY QUESTIONS.**

01. Explain why on trucks braking systems with compressed air is always used instead of hydraulic systems. **3marks**
02. Enumerate the two(2) types of sealing indicators used on oil filters. **2marks**
03. Give two(2) types of volumetric pumps for the oil to constant flow/debit and three (3)types of pumps with variable flow. **5marks**
04. Give the sets of braking systems which are found on a vehicle with trailer. **5marks**
05. What is the use of an antifreeze pump in the pneumatic system? **2marks**
06. Give the role of the following elements in hydraulic systems:  
(a) a cooler; (b) an interchange; (c) a heater. **3marks**
07. In a hydrostatic transmission, give the factors which determine:  
a. the control of the speed  
b. the direction  
c. the control of the power. **6marks**
08. Give four(4) components of a braking system to compressed air and the role of each of the components **4marks**
09. Directional control valves are one type of valves used in pneumatic systems. Name four(4) other types of valves used. **4marks**
10. What would be the flow rate (in mm/s and L/min) of a fluid that circulates in a line of 60mm in diameter at a speed of 120mm/s? **3marks**
11. List three(3) drying methods used in industrial automation for retaining condensate water? **3marks**
12. Symbolically represent the following components:  
a. Vacuum pump  
b. Throttle valve, adjustable, manual operation  
c. Shuttle valve  
d. Service unit (simplified symbol)  
e. An AND logic symbol. **5marks**
13. Name five (5) functions of the steering system. **5marks**
14. Using a sketch, show how to test the diode with ohmmeter. **3marks**
15. Draw the electrical diagram of Alternating current. **2marks**

**SECTION II. ATTEMPT ANY THREE (3) QUESTIONS.**

16. Give the constituent elements for each of the following hydraulic converters:

- a. Mono-staged converter
- b. Converter bi - staged
- c. Converter staged sorting

Give the proportions of multiplication of the couple as well as the percentage of efficiency on each of the types of converters above quoted. **10marks**

17. Draw a typical industrial reservoir and identify its parts. **10marks**

18. By means of small hydraulic systems, give three (3) possible positions of hydraulic filters in hydraulic systems. The positions to be represented are:

- a. Filter in the inhalation /pursuit;
- b. Filter of pressure;
- c. Filter of return.

The hydraulic system has to contain:

- a) A reservoir
- b) A pump
- c) A pressure regulator
- d) A distributor
- e) A jack doubles effect

**10marks**

19. a) Determine the various braking systems according to their types of energy.

b) Specify for every type of braking system, the types of vehicles on which these devices are taken up.

c) How is the strength of braking passed down to the brakes of wheels? **10marks**

20. a) List the common characteristics of hydraulic pumps. **5marks**

b) List five (5) functions of a planetary gear set. **5marks**

**SECTION III. ATTEMPT ANY ONE (1) QUESTION.**

21. Present the hydraulic system of a system which will activate a jack double effect whose speed is adjustable in return of stalk.

The circuit will also include the following elements:

- a) A hydraulic pump commanded/ordered by an electric engine
- b) A manipulator 3/2
- c) A distributor 4/2 with opened center, with hydraulic order
- d) A protection of the excess loads of the pump
- e) An indicator of sealing on the return.

**15marks**

22. Sketch a compressed air brake system (schematic diagram) consisting of:

Dual-circuit, compressed- air power-brake system (low pressure) with pneumatic suspension, pneumatic door control and no-linkage parking brake for buses with pneumatic suspension.

**15marks**

23. a) Name five (5) effects of excessively low clutch play.

**5marks**

- b) Name the possible causes of front wheel shimmy.

5marks

- c) For Hydraulic systems, what five (5) regular maintenance routine are recommended?

**5marks**