

MVM – Hydraulic Pneumatic

T082

Wednesday, 21/11/2018

08:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY



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

**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2018,
TECHNICAL AND PROFESSIONAL STUDIES**

EXAM TITLE: HYDRAULIC PNEUMATIC
OPTION: Motor Vehicle Mechanics (MVM)
DURATION: 3 hours

INSTRUCTIONS:

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

Section I: Fifteen (15) compulsory questions.	55 marks
Section II: Attempt any three (3) out of five questions.	30 marks
Section III: Attempt any one (1) out of three questions.	15 marks

Note:

Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration.

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

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- 01.** Differentiate hydraulic from pneumatic systems. **(4 marks)**
- 02.** State Pascal's Law on intensity of pressure. **(2 marks)**
- 03.** A lifting platform is to lift a load of 15 000 N and is to have a system pressure of 75 bar, how large does the piston surface need to be? **(2 marks)**
- 04.** A cylinder of gas under a pressure of 125 bars (Gauge) at 70 °F is left out the sun in tropics and heats up to a temperature of 130 °F, what is the new pressure within the cylinder? **(5 marks)**
- 05.** Some of the following statements are real while others are erroneous (wrong). Distinguish clearly the two categories and show real and wrong statements. **(5 marks)**
- (i) Pneumatic systems are used for high pressure and low speed applications.
 - (ii) Pneumatics is very useful in hazardous environment.
 - (iii) Compressed air is expensive.
 - (iv) According to Barometric law, the atmospheric pressure increase with the increase in altitude.
 - (v) If a given mass of gas is compressed or expanded at a constant temperature, then the absolute pressure is directly proportional to the volume.
- 06.** A hydraulic pump delivers 12 L of fluid per minute against a pressure of 200 bars.
- a. Calculate the hydraulic power.
 - b. If the overall pump efficiency is 60%, what would be the size of electric motor needed to drive the pump? **(4 marks)**
- 07.** Explain the function of the components in fluid powers system. **(4 marks)**
- 08.** List three types of pressure control valves. **(3 marks)**

09. What is the purpose of compressors starting unloaded control? **(4 marks)**
10. What is meant by the term Cylinder Cushion? **(3 marks)**
11. Give three advantages and two disadvantages of Hydraulic brakes. **(5 marks)**
12. List four important factors that should be considered while designing any fluid power circuit. **(4 marks)**
13. What is the function of relay contacts? **(4 marks)**
14. If a hydraulic motor does not provide the proper speed and torque, what could be the possible causes for it? **(4 marks)**
15. In what condition shuttle valves need to be used? **(2 marks)**

Section II. Choose and Answer any three (3) questions **30 marks**

16. Give some important advantages and disadvantages of hydraulic compared to other technologies. **(10 marks)**
17. a) Highlight the need of using an accumulator in hydraulic circuits.
b) What are the effects caused by contamination of pneumatic or hydraulic lines. **(10 marks)**
18. a) Sketch a schematic diagram of Single-circuit, dual-line compressed-air trailer power-brake system (low pressure) with mechanical parking brake. (Of not more than 16 tones).
b) Name the operation by which trapped air from hydraulic system is removed? **(10 marks)**
19. a) Mention five routine maintenances to be done regularly in hydraulic system.
b) Mention five routine maintenances to be done regularly in pneumatic system. **(10 marks)**

20. a) If a hydraulic motor does not provide the proper speed and torque, what could be the possible causes for it?
- b) What will you do to reduce/prevent excessive heating of oil in a hydraulic system?

(10 marks)

Section III. Choose and Answer any one (1mark) question

15 marks

21. Mention the causes of inoperative hydraulic system.

(15marks)

22. a) What are the main parts of a rotary pump?

b) How does it work?

c) Name the possible causes of pump oil over-heated.

(15 marks)

23. Sketch a schematic diagram of compressed air brake system consisting of Dual-circuit, compressed-airpower-brake system (high pressure) with no-linkage parking brake for commercial vehicles without trailer with a gross vehicle weight from approx. 6 to 13 tonnes. (There are three equipment groups).

(15marks)