



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2418: PNEUMATICS & ELECTROHYDRAULICS

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- Answer Booklet

This paper consists of **FIVE** questions. Answer any other **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One

- a) Outline **THREE** basic advantages and disadvantages of pneumatic systems. **(3 marks)**
- b) Explain **TWO** effects for each of the following properties of Air with reference to pneumatic systems:
- (i) Viscosity
 - (ii) Compressibility
 - (iii) Lubricity **(6 marks)**
- c) Differentiate between Dynamic and Positive displacement compressor in terms of operating principles and give **TWO** examples for each case. **(4 marks)**

- d) With the aid of sketches, illustrate the operation of the following components as used in pneumatic systems:
- (i) Bi-directional throttle valve
 - (ii) Quick exhaust valve
- (8 marks)**

Question Two

- a) With the aid of a diagram, explain the construction and operation of the following types of filters in pneumatic systems:
- (i) Air standard filter
 - (ii) Air separator
- (10 marks)**
- b) Draw a labeled sectional view of an Air Mist Lubricator and explain its operation. **(5 marks)**
- c) With the aid of a schematic circuit layout, explain the operation of a Refrigerated Dryer. **(5 marks)**

Question Three

- a) (i) Discuss the importance of pressure regulators in pneumatic systems and their appropriate location in the system.
- (ii) Explain **THREE** methods of local pressure control to pneumatic loads and state the suitable type of regulator for each case. **(8 marks)**
- b) Illustrate the construction and operation of the following pressure regulators in pneumatic systems:
- (i) Relieving pressure regulator
 - (ii) Non-relieving pressure regulator
- (8 marks)**
- c) By use of pneumatic symbols illustrate the service unit of a pneumatic system. **(4 marks)**

Question Four

- a) (i) Outline the **THREE** basic functions of Directional Control valves.
- (ii) Draw a sectional view of a 3/2 way Directional Control valve hand operated and spring offset. **(7 marks)**
- b) Illustrate the operation of a check valve as used in pneumatic systems. **(4 marks)**
- c) Explain the construction and operation of the following pneumatic actuator.
- (i) Tandem double acting cylinder
 - (ii) Radia type Air piston motor
- (9 marks)**

Question Five

- a) (i) Design a semi automatic pneumatic system with a double acting cylinder to achieve automatic extension and retraction strokes using the following components.
- (i) 5/2 way pilot operated valve
 - (ii) 4/2 way hand operated spring offset valve
 - (iii) 4/2 sequence valve spring offset

(iv) Throttle valve

(ii) Explain the operation of the system in (ai)

(8 marks)

b) With the aid of a sketch, explain the operation of an automotive power servo.

(8 marks)

c) Describe the operation of the following devices:

(i) Solenoid switches

(ii) Relay

(4 marks)