

2502/105
PLANT MAINTENANCE
Oct./Nov. 2022
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN MECHANICAL ENGINEERING
(PLANT OPTION)

MODULE I
PLANT MAINTENANCE

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Non programmable scientific calculator.

*Answer **FIVE** the following **SEVEN** questions in the answer booklet provided.*

Maximum marks for each part of a question are indicated.

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

1. (a) (i) State **five** benefits of an efficient material handling system.
(ii) List **five** factors considered when selecting a material handling system. (5 marks)
- (b) (i) With the aid of a sketch, explain the construction of a bucket elevator.
(ii) State **five** maintenance checks carried out on the elevator in b (i). (7 $\frac{1}{2}$ marks)
- (c) (i) Outline **three** methods of extinguishing fire.
(ii) With the aid of a diagram, describe a dry riser used in fire fighting. (7 $\frac{1}{2}$ marks)
2. (a) (i) State **five** direct uses of compressed air in engineering industry.
(ii) Outline **three** installation requirements of a compressed air distribution system. (5 $\frac{1}{2}$ marks)
- (b) (i) Illustrate the features of a compressed air receiver.
(ii) State **five** checks carried out during bi-annual statutory inspection of an air receiver. (5 $\frac{1}{2}$ marks)
- (c) Outline **three** provisions under Occupational Safety and Health Act, on each of the following:
(i) welfare;
(ii) health;
(iii) personal protective equipment. (9 marks)
3. (a) (i) With the aid of diagram, explain the operation of a vane compressor.
(ii) List **five** maintenance tasks carried out on the compressor in 3(a)(i).
(iii) Outline **three** uses of accident investigation reports. (11 $\frac{1}{2}$ marks)
- (b) (i) Explain the importance of accident reporting and investigation.
(ii) Outline **four** uses of accident investigation reports. (5 $\frac{1}{2}$ marks)

- (c) State **three** uses of each of the following during first aid.
- (i) dressings;
 - (ii) bandages.
- (3 marks)
4. (a) (i) With the aid of a diagram, explain the operation of a belt conveyor.
- (ii) With the aid of diagrams, explain **two** methods of belt tensioning the conveyor in 4(a)(i).
- (11 marks)
- (b) Outline the procedure of registering a workplace as per the OSHA, 2007. (6 marks)
- (c) State **six** causes of accidents in an engineering workshop. (3 marks)
5. (a) (i) State **two** functions of a lubricant.
- (ii) List **two** requirements of a lubricant.
- (iii) With the aid of a diagram, explain the construction and the operation of a drop lubricator.
- (7 marks)
- (b) (i) With the aid of a diagram, explain the operation of a pilot operated relief valve.
- (ii) State **two** causes and **two** remedies for each of the following problems of a hydraulic system:
- (I) slow or sluggish operation;
 - (II) oil foaming.
- (9 marks)
- (c) State **two** causes and **two** remedies for each of the following problems of a chain power transmission system:
- (i) excessive noise;
 - (ii) chain climbs the sprocket.
- (4 marks)

6. (a) With the aid of a sketch, describe an open belt drive power transmission system. (3 marks)
- (b) (i) State **three** factors that influences selection of a lubricant for a particular use.
- (ii) With the aid of a diagram, describe the construction and operation of a wick feed oiler. (8 $\frac{1}{2}$ marks)
- (c) (i) Explain the installation of requirements of a centrifugal pump with respect to:
- (I) foundation;
- (II) suction piping;
- (III) discharge piping.
- (ii) State **two** causes and **two** remedies for each of the following problems of a centrifugal pump.
- (I) not enough pressure;
- (II) pump takes too much power. (8 $\frac{1}{2}$ marks)
7. (a) (i) State **four** functions of a hydraulic oil reservoir.
- (ii) Outline **four** causes of hydraulic hose failure. (8 marks)
- (b) With the aid of a diagram, explain the operation of a portable soda-acid water fire extinguisher. (5 marks)
- (c) (i) Explain the occurrence of cavitation in centrifugal pumps.
- (ii) List **four** effects of cavitation.
- (iii) Outline the manual procedure of priming a centrifugal pump. (7 marks)

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