

Name: _____ Index No: _____

2501/206
TOOL ROOM PROCESSES
TECHNOLOGY II AND METROLOGY
Oct./Nov. 2014
Time: 3 hours

Candidate's Signature: _____

Date: _____



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN MECHANICAL ENGINEERING
(PRODUCTION OPTION)
MODULE II

TOOL ROOM PROCESSES TECHNOLOGY AND METROLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.

Sign and write the date of examination in the spaces provided above.

You should have drawing instruments, and a calculator for this examination.

This paper consists of TWO sections A and B.

Answer FIVE questions taking at least TWO questions from each section in the spaces provided in this question paper.

All questions carry equal marks.

Maximum marks for each part of a question are as shown.

Candidates should answer the questions in English.

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A		20	
		20	
		20	
B		20	
		20	
		20	
Total Score			

This paper consists of 16 printed pages.

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

SECTION A: TOOL ROOM PROCESSES TECHNOLOGY II

Answer at least TWO questions from this section.

1. (a) State any **three** advantages and any **two** disadvantages of a gear drive. (5 marks)
- (b) With aid of a sketch, explain the following gear terms:
- (i) addendum;
 - (ii) dedendum;
 - (iii) pitch circle;
 - (iv) root circle;
 - (v) base circle.
- (5 marks)
- (c) Illustrate the set-up for cutting a spur gear on a horizontal milling machine using a form cutter. (7 marks)
- (d) State any **two** advantages and **one** limitation of the method in (c) above. (3 marks)
2. (a) Explain the following terms with regard to a grinding wheel:
- (i) grade;
 - (ii) structure;
 - (iii) dressing;
 - (iv) truing.
- (8 marks)
- (b) With the aid of sketches, describe the following methods of cylindrical grinding:
- (i) traverse grinding;
 - (ii) plunge-cut grinding;
 - (iii) full depth.
- (6 marks)
- (c) State any **six** factors considered in the selection of a grinding wheel. (6 marks)
3. (a) State **three** methods of classifying internal grinding machines. (3 marks)
- (b) With the aid of a sketch, explain the centreless grinding. (9 marks)
- (c) State the limitations of internal centreless grinding. (3 marks)
- (d) Illustrate how internal taper grinding may be achieved. (5 marks)

4. (a) Describe any **five** components of a press. (5 marks)
- (b) List the factors to be considered for the selection of the proper size and type of press for a given kind of work. (5 marks)
- (c) With the aid of a sketch, explain the deep drawing operation. (10 marks)
5. (a) (i) Describe unconventional machining. (5 marks)
- (ii) State **three** main reasons for using unconventional machining methods. (5 marks)
- (b) (i) With the aid of a sketch, explain the working principle of electro-chemical machining process. (12 marks)
- (ii) State any **four** characteristics of electro-chemical machining processes. (12 marks)
- (c) List any **six** advantages and **two** disadvantages of laser beam machining. (3 marks)

SECTION B: METROLOGY

Answer at least TWO questions from this section.

6. (a) Describe the following diameters of a screw thread: (3 marks)
- (i) minor;
- (ii) major;
- (iii) effective.
- (b) With the aid of a sketch, describe the machine method of measuring the pitch of a screw thread. (9 marks)
- (c) Explain the effects of errors in each of the following elements of a screw thread: (4 marks)
- (i) major diameters;
- (ii) effective diameter.
- (d) State any **four** important factors considered when selecting a thread form. (4 marks)

7. (a) State any **four** important characteristics of air gauging in pneumatic comparators. (4 marks)
- (b) List the **three** essential requirements in the use of a sine bar to get accurate results. (6 marks)
- (c) Explain any **four** precautions to be taken while using a sine bar. (4 marks)
- (d) Illustrate how a sine bar may be used to check heavy angled components. (6 marks)
8. (a) Define surface texture. (2 marks)
- (b) Explain the following and state their causes:
- (i) primary texture;
- (ii) secondary texture. (5 marks)
- (c) Explain how geometrical irregularities are classified. (4 marks)
- (d) With the aid of a sketch, explain the working principle of a perthometer. (9 marks)