



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

DIPLOMA IN MECHANICAL ENGINEERING (PLANT OPTION)

STAGE II SEMESTER II EXAMINATIONS

SERIES: APRIL/MAY 2010

PRODUCTION TECHNOLOGY & METROLOGY

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:

- TWO Answer Booklet
- Drawing Instruments
- Scientific Calculator

This paper consists of **FIVE** Questions in **TWO** Sections **A** and **B**.

Answer any **TWO** Questions from Section **A** and **ONE** from Section **B**.

All questions carry equal marks.

SECTION A : Answer any TWO Questions from this Section.

Question ONE

- (a). (i). Name at least **THREE** methods used in the production of powders in powder metallurgy. **(3 Marks)**
- (ii). State **FIVE** objectives of powder metallurgy. **(5 Marks)**
- (b). (i). State **FIVE** limitations of powder metallurgy.
- (ii). With the aid of labeled sketches briefly describe the process of making a porous self lubricating bearing. **(12 Marks)**

Question TWO

- (a). (i). State **FIVE** advantages of lost wax casting.
- (ii). State **THREE** limitations of lost wax casting. **(8 Marks)**
- (b). Explain briefly the process of pattern making in lost wax process. **(6 Marks)**
- (c). (i). List **FOUR** advantages of honing.
- (ii). Briefly explain the process of honing. **(6 Marks)**

Question THREE

- (a). Define the following terms:
- (i). Blanking
- (ii). Piercing
- (iii). Drawing **(3 Marks)**
- (b). (i). Show a set up of a set of blanking and piercing die, label the main parts.
- (ii). State **FOUR** factors that determine the design of a blanking die. **(7 Marks)**
- (c). Explain the use of the following parts in press work:
- (i). Punch
- (ii). Die
- (iii). Stupper
- (iv). Pressure plate **(4 Marks)**

(d). In a deep drawing operation a cup is to be drawn to a diameter of 80.3 x 50mm deep in a 0.4mm thick material. The ultimate tensile strength is 500N/mm², approximate:

- (i). The blank diameter
- (ii). The drawing ratio
- (iii). The maximum drawing force

(6 Marks)

SECTION B: METROLOGY

Question FOUR

(a). (i). What is kinematics.

(ii). State the theorem of kinematics.

(iii). Use a sketch to illustrate the theorem in a (ii). above.

(iv). State the characteristics achieved when kinematic principle are followed in design of machines and instruments. **(6 Marks)**

(b). State the conditions to be satisfied when mounting a surface plate on a stand. **(4 Marks)**

(c). State the **THREE** conditions to be realized during manufacture of moving member of a vee-flat ball slide to have true linear motion. **(3 Marks)**

(d). Explain briefly with the aid of a sketch the operational principle of the Autocollimator. **(7 Marks)**

Question FIVE

(a). Explain briefly with the aid of a sketch the operational principle of the roundness testing machine. **(9 Marks)**

(b). (i). State the **FOUR** methods of finding the roundness error.

(ii). Discuss briefly the most accurate method, of the **FOUR** methods in b(i). above. **(4 Marks)**

(c). With the aid of a sketch, explain how the squareness of try-square may be checked using the Auto-collimeter. **(7 Marks)**