



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

MED-PR 215: PRODUCTION TECHNOLOGY II

DATE: 8/5/2019

TIME: 2.00-4.00 PM

INSTRUCTIONS:

Answer Question One (Compulsory) and Any Other Two Questions

QUESTION ONE (30 MARKS)

- a) i Differentiate between cutting and forming operations as used in press work. (4 marks)
- ii Define the term spring back and explain how allowances are made to compensate for its harmful effects. (4 marks)
- b) Calculate the diameter of a hole that can be punched in a 1.5mm thick aluminium. Plate if the punching force is limited to 40KN and the ultimate shear strength of the plate is 90N/mm^2 . (4 marks)
- c) Explain the working principle of a radiation pyrometer as a means of measuring furnace temperature with the aid of a sketch. (12 marks)
- d) Describe any THREE factors to consider in the selection of gear materials. (6 marks)

QUESTION TWO (20 MARKS)

- a) State any FIVE areas of application for gears (5 marks)
- b) Describe the following methods of manufacturing gears.
 - i. Casting

- ii. Metal forming. (8 marks)
- c) Describe the following methods of gear finishing
 - i. Gear Shaving. (3 marks)
 - ii. Gear burnishing. (4 marks)

QUESTION THREE (20 MARKS)

- a) Define the following terms as used in press work.
 - i. Blanking
 - ii. Punching
 - iii. Squeezing (6 marks)
- b) List any THREE requirements which have to be met in the design of press tools. (3 marks)
- c) In a punching operation, 10mm diameter holes are punched in a plate which is 5mm thick. If the shear strength of the material of the plate is 320N/mm^2 . Determine;
 - i. The force that must be applied to the punch. (6 marks)
 - ii. The work done in punching the hole, assuming the force on the punch to remain constant during the punching process. (5 marks)

QUESTION FOUR (20 MARKS)

- a) State and explain any FIVE requirements which need to be met by heat treatment furnaces. (10 marks)
- b) With the aid of a sketch describe the working principle of an electrically heated furnace stating TWO advantages and TWO limitations. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Describe the following metal finishing processes.
 - i. Honing (2 marks)
 - ii. Buffing (2 marks)
 - iii. Lapping (2 marks)
 - iv. Polishing. (2 marks)
- b) Describe the following methods of surface preparation processes.

- i. Descaling
 - ii. Deburring
 - iii. Degreasing (6 marks)
- c) Explain the following metal coating processes.
- i. Galvanising
 - ii. Electroplating (6 marks)