



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN MECHANICAL ENGINEERING

MED-PR 312: ENGINEERING DESIGN II

DATE: 8/5/2019

TIME:8.30-10.30 AM

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## INSTRUCTIONS:

**Answer Question One (Compulsory) and Any Other Two Questions**

**You need the following for this examination:**

- Drawing instruments,
- Scientific calculator.

### QUESTION ONE (30 MARKS)

- a) State the principle of each of the following with regard to Jigs and Fixtures design.
- i. Location;
  - ii. Clamping. (10 marks)
- b) Sketch FOUR types of drill bushes in Jigs design. (12 marks)
- c) With the aid of a sketch, explain the point location principle. (8 marks)

### QUESTION TWO (20 MARKS)

- a) State TWO requirements of the clamping system in jigs and fixtures. (4 marks)
- b) List FOUR uses of clearances in Jig design. (8 marks)
- c) With aid of a sketch explain the following types of locators:
- i. Support pad,
  - ii. Adjustable pin. (8 marks)

**QUESTION THREE (20 MARKS)**

- a) Explain redundant location. (4 marks)
- b) Illustrate the following clamps in their application :
- i. Latch-type clamp ;
  - ii. Equalizing clamp.
  - iii. Cam-operated clamp. (16 marks)

**QUESTION FOUR (20 MARKS)**

- a) Define the following costs of production, giving TWO examples in each case:
- i. Material cost,
  - ii. Direct cost. (8 marks)
- b) Design a simple machine capable of extracting juice from sunflower seeds. Explain how your machine works. (12 marks)

**QUESTION FIVE (20 MARKS)**

- a) State TWO advantages of hydropower. (2 marks)
- b) Explain the following terms:
- i. Turbine,
  - ii. Solar power,
  - iii. Transformer. (6 marks)
- c) Explain four forms of green energy. (12 marks)