



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
MECHANICAL ENGINEERING

MED-PR 311: ENGINEERING DESIGN II

DATE: 13/12/2017

TIME: 8:30 – 10:30 am

INSTRUCTIONS

This paper consists of *FIVE* questions

Answer question *ONE* (compulsory) and any other *TWO* questions

You need Drawing instruments to write this examination.

1. a) Differentiate between Jigs and Fixtures. (4 marks)
- b) Explain the principle of Jigs and Fixtures design with regard to the following.
 - i Stability and rigidity.
 - ii Clamping.
 - iii Clearance
 - iv Location. (12 marks)
- c) Illustrate the following clamps in the applications.
 - i Button clamp
 - ii Equalizing clamp (8 marks)
- d) Explain the essential features of an indexing jig. (6 marks)

2. Design a fixture for milling the slot shown in Figure 1, on five workpieces in one setting. (20 marks)
3. With the aid of a sketch, explain the six degrees of freedom of a body in space.(20 marks)
4. a) Explain appropriate technology. (4 marks)
- b) Make a simple design sketch of a sunflower oil processing machine that can be manufactured in Machakos University mechanical engineering workshops. (16 marks)
5. a) List FIVE sources of renewable energy. (5 marks)
- b) Explain the following costs in producing a part in factory with appropriate examples.
- i Fixed cost.
- ii Variable cost. (6 marks)
- c) i Sketch a break-even chart for a single product and label its important parts. (7 marks)
- ii Outline two uses of break-even analysis. (2 marks)