

MACHAKOS UNIVERSITY
UNIVERSITY EXAMINATIONS 2018/2019
SCHOOL OF ENGINEERING AND MANUFACTURING ENGINEERING
FOURTH YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE MECHANICAL ENGINEERING

EMM513: JIGS AND FIXTURES

DATE:

TIME: 2 Hours

INSTRUCTIONS

- The Paper Consists of FIVE questions
 - Answer Question ONE and ANY other TWO questions
 - Use clear and neat diagrams
 - Answer books provided
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Question one 30 Marks (Compulsory)

- a) With aid of well labeled diagram, distinguish between a Jig and a Fixture (4 Marks)
- b) Explain THREE the principles of economic design in Jigs and Fixtures (6 Marks)
- c) Describe **FIVE** fundamental principles in design of Jigs and Fixtures (10 Marks)
- d) Discuss the role of Jigs and Fixtures on machining cost (10 Marks)

Question Two

- a) Describe **FIVE** basic principles need to be followed while planning for locating blanks in fixtures (10 Marks)
- b) Explain **FIVE** factors essentially need to be considered in designing for clamping the work-piece in a fixture (10 Marks)

Question Three

- a) Explain and illustrate the following two Clamping method and system used in jigs and fixture
 - i) general type without much consideration on speed of clamping operations (5 Marks)
 - ii) quick acting types (5 Marks)
- b) Describe the following two primary methods of locating work from a flat surface:
 - i) Solid supports (5 marks)
 - ii) Adjustable supports (5 Marks)

Question Four

- a) Describe and illustrate the following two common type of ejectors:
 - i) Mechanical ejector (5 Marks)
 - ii) Spring plunger ejector (5 Marks)
- b) Explain FIVE safety features related to tool design (10 Marks)

Question Five

Five hundred guide plates must be milled to receive a locating block. The tool designer has determined three possible alternatives:

1st Alternative: Have a toolmaker, who earns Kshs120 per hour, mill the plates at a rate of 25 per hour.

2nd Alternative: Use limited tooling that costs Kshs350 in the production department. The machine operator in this department, who earns Kshs 70 per hour, can make a part every 1.2 minutes.

3rd Alternative: Use a more expensive tool that costs Kshs110 but is capable of producing a part every 24 seconds. This would be done in the production department, where a machine operator earns Kshs 70 per hour.

Which alternative should the tool designer select as the most efficient and economical? (20 Marks)