



# TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology  
DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

## UNIVERSITY EXAMINATION 2013/2014

FOURTH YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR  
THE DEGREE OF BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

### EMG 2422 : JIGS AND TOOL DESIGN

TIME: 2 HOURS

SERIES: DECEMBER, 2013

#### INSTRUCTIONS TO CANDIDATES

1. You are required to have the following for these examinations:
  - Drawing Instruments
  - Scientific Calculator
2. This paper has **FIVE** Questions.
3. Answer **ANY THREE** Questions.
4. All Questions carry **EQUAL** marks.
5. This paper consists of **FOUR Printed pages**.

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#### QUESTION 1

(a) Explain the following principles of jigs and fixture:

- (i) Location
- (ii) Clamping
- (iii) Clearance
- (iv) Stability and rigidity

(10 marks)

(b) Sketch the following clamping devices:

- (i) Latch type clamp
- (ii) Removable clamp with a swing bolts
- (iii) Cam operated clamp

**(10 marks)**

## **QUESTION 2**

(a) Sketch the following types of locations:

- (i) Fixed conical locators
- (ii) Adjustable conical locator
- (iii) Sliding Vee locator

**(10 marks)**

(b) Design a simple solid-type jig for use when drilling the 10mm diameter hole in the stem of the pin shown in the figure. The pin is complete except for the hole.

**(10 marks)**

## **QUESTION 3**

(a) Describe the following presswork operations:

- (i) Blanking
- (ii) Piercing
- (iii) Bending
- (iv) Drawing

**(8 marks)**

(b) Design:

- (i) Blank and a piercing press tool to produce the shown in figure below before bending.
- (ii) A bending tool set for bending the bracket.

**(12 marks)**

#### **QUESTION 4**

(a) Explain the use of indexing and fixtures. **(3 marks)**

(b) Describe the essential features of an indexing jig. **(5 marks)**

(c) Sketch the following indexing devices:

- (i) Simple level indexing system
- (ii) Plunger system adverted by rack and pinion

**(8 marks)**

(d) Sketch the following gap gauge used to gauge shafts:

- (i) Plain Gap Gauge
- (ii) Adjustable Gap Gauge

**(4 marks)**

Q.5 (a) Describe the process planning procedure. **(10 marks)**

(b) Develop an operational layout for the adaptor below: **(10 marks)**

