



# TECHNICAL UNIVERSITY OF MOMBASA

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Faculty of Engineering and Technology

DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

## UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MECHANICAL ENGINEERING (DMEN 6)

EAU 2305 MOTOR VEHICLE DRAWING AND DESIGN II

END OF SEMESTER EXAMINATION

**SERIES: DEC 2016** PAPER-A

**TIME: 2 HOURS**

**DATE: 2016**

### **Instructions to Candidates**

You should have the following for this examination

-*Answer Booklet, examination pass and student ID*

This paper consists of FIVE questions. Attempt ANY THREE.

**Do not write on the question paper.**

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### Question One

The Figure 1 shows the instantaneous position of a mechanism in which member OA rotates anticlockwise with an angular velocity of  $100\text{rad/s}$  and angular acceleration of  $10,000\text{rad/sec}^2$  in the same direction. BD is a continuation of the rigid link AB. The links have the following lengths:- OA = 30mm; BC = 90mm; AD = 168mm; AB = 120mm.

Determine:-

- (a) The velocities of points A, B, and D.
- (b) The absolute linear acceleration of points A and B.

(20 marks)

### Question Two

A four-passenger car is to be designed to be used in Mombasa.

- (a) Explain any ten factors that should be considered.
- (b) Outline a typical procedure to be followed to undertake the task.

(20 marks)

### Question Three

- (a) Explain the importance of the following factors when designing a machine:-
  - (i) Size
  - (ii) Shape
  - (iii) Weight
  - (iv) Space

(8 marks)

- (b) Differentiate between adaptive design and development design, giving typical examples.

(4 marks)

- (c) Distinguish between unilateral and bilateral tolerances. Use diagrams to aid your answer and give specific examples.

(8 marks)

### Question Four

- (a) Describe the following types of bearings, stating where each is applicable in a motor vehicle:-

- (i) Sliding contact bearings
- (ii) Rolling contact bearings

(8 marks)

- (b) Draw the bearings indicated below:-

- (i) Cylindrical roller
- (ii) Taper roller
- (iii) Self-aligning bearing
- (iv) Single row bearing

(12 marks)

**Question Five**

A gear wheel has 24 number of teeth, pressure angle of  $20^\circ$  and a module of 6.5. Construct the gear tooth profile upto three teeth.