



**TECHNICAL UNIVERSITY OF MOMBASA  
FACULTY OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING**

**DIPLOMA IN AUTOMOTIVE ENGINEERING  
Y3S2**

**EAU 2307 MOTOR VEHICLE DRAWING AND DESIGN II**

**END OF SEMESTER EXAMINATIONS**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**Instructions to Candidates**

You should have the following for this examination:-

- Drawing instruments
- Scientific calculator

The paper consists of **FIVE** Questions.

Answer any **THREE** Questions.

All questions carry equal marks.

Maximum marks for each part of a question are shown in the parenthesis.

### Question One

- (a) Explain why:-
- (i) Countersunk holes are provided at the top of the body of the bearing;
  - (ii) Elongated holes are generally provided in the base of a bearing;
  - (iii) The base of the bearing is generally kept hollow at the bottom
- (6 marks)
- (b) Draw the different shapes of the rolling elements used in anti-friction bearings.
- (8 marks)
- (c) Illustrate through sketches, the mounting of:-
- (i) Radial ball bearing
  - (ii) Thrust ball bearing
- (6 marks)

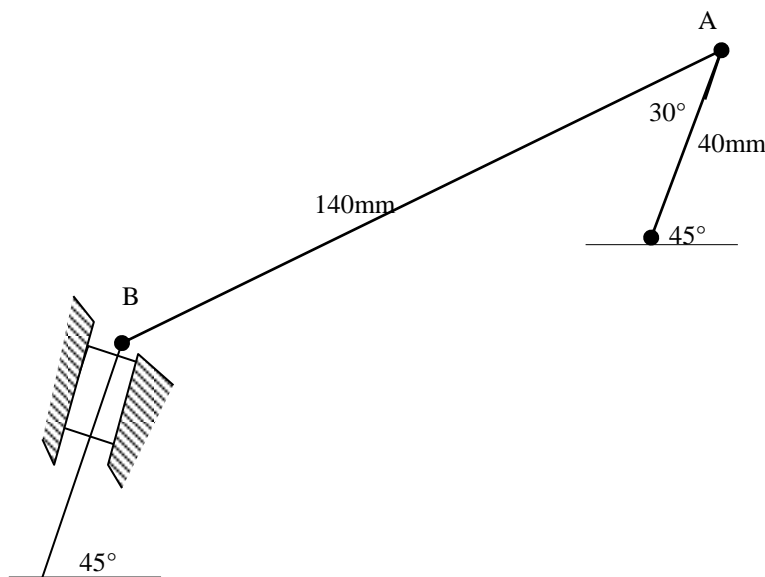
### Question Two

Draw the complete profile of a gear having 20 teeth of involute form of 6.5 module and pressure angle of  $20^\circ$ .

(20 marks)

### Question Three

For the fig. 1 given below, crank OA rotates at 200rev/min clockwise. Find the relative velocity of the piston and the angular velocity of AB about point A.



**Fig. 1**

(20 marks)

#### **Question Four**

- (a) Explain the following classifications of fits:-
- (i) Running fit
  - (ii) Push fit
  - (iii) Driving fit
  - (iv) Forced fit
- (8 marks)
- (b) Using well labeled diagrams, show the three different types of fits and briefly explain each.
- (9 marks)
- (c) List the three types of errors that occur during the manufacture of any component.
- (3 marks)

#### **Question Five**

- (a) Define the following terms with regard engineering design:-
- (i) Manufacture
  - (ii) Reliability
  - (iii) Safety
- (3 marks)
- (b) Explain the importance of the following factors in machine design:-
- (i) Size
  - (ii) Space
  - (iii) Shape
  - (iv) Weight
- (8 marks)
- (c) Describe the following types of engineering design based on methods:-
- (i) Rational design
  - (ii) Empirical design
  - (iii) Industrial design
- (9 marks)