



**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 gear has 30 teeth of involute profile, pitch circle diameter of 180mm and pressure angle of  $20^\circ$ . Draw the profile of the four complete teeth for the gear.

(20 marks)

### Question Two

(a) Distinguish between :-

- (i) Sliding contact bearings and rolling contact bearings
- (ii) Journal bearing and thrust bearing.

(4 marks)

(b) What are the commonly used bearing materials?

(4 marks)

(c) Why are the collars provided at the sides of a bearing brasses.

(2 marks)

(d) Sketch sectional views of the following:-

- (i) Cylindrical roller bearing
- (ii) Single row roller bearing
- (iii) Thrust ball bearing

(10 marks)

### Question Three

(a) Explain the following types of engineering design:-

- (i) Creative design
- (ii) Adaptive design
- (iii) Development design

(6 marks)

(b) List any six factors to be considered when designing a machine or component.

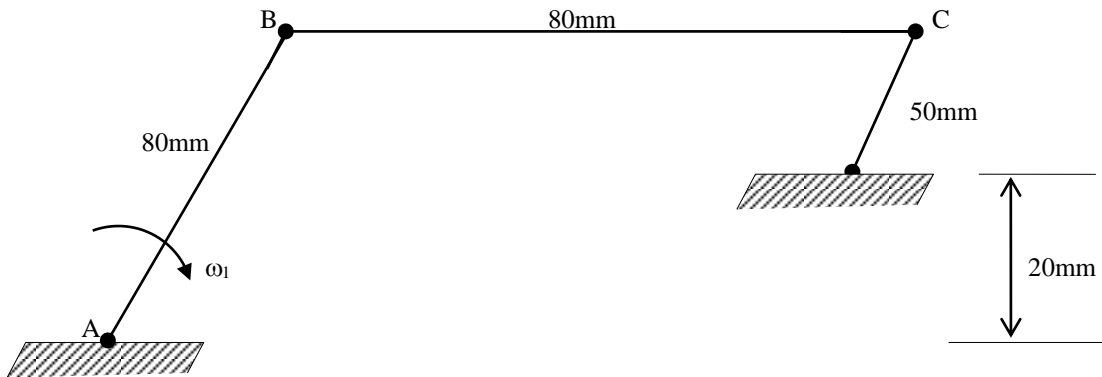
(6 marks)

(c) Explain the methodology steps followed generally by a design engineer to design a machine.

(8 marks)

#### Question Four

Determine the angular velocity of the link CD for the fig. 1 shown below and the direction of rotation. The diagram is not to scale. The input rotates at 500 rev/min. Link BC is horizontal.



**Fig. 1**

#### Question Five

(a) Distinguish between:-

- (i) Limits and fits
- (ii) Allowance and tolerance
- (iii) Unilateral and bilateral tolerance

(6 marks)

(b) Using an example of 24mm as the nominal size and using 0.02mm, write the correct upper and lower limits for both the hole and the shaft for:-

- (i) Unilateral tolerance
- (ii) Bilateral tolerance

And hence represent them diagrammatically.

(10 marks)

(c) Explain any four reasons why the systems of limits and fits are used

(4 marks)