

**FINAL  
ALTERNATIVE ASSESSMENT**

(COVER PAGE)

Session : April 2022

Programme : Diploma in Mechanical Engineering (DMEN)

Course : **EGM1181: Engineering Dynamics**

Date of Examination : August 3, 2022 (Wednesday)

Time : 12.00pm – 2.30pm Reading Time : Nil

Duration : 2 Hours 30 Minutes

**Special Instructions :**

This paper consists of **FOUR (4)** questions. Answer **ALL** the questions. Write **ALL** your answers in the foolscap papers.

**NOTE :** 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts.

Material permitted : Non-Programmable Scientific Calculator

Materials provided : Nil

Examiner(s) : **Mr Ganaswaran Segar** and Mr Ashwindran Naidu Sanderasagran

Chief Moderator : Mr Soo Swee Yoong

*This paper consists of 5 printed pages, including the cover page*

DIPLOMA IN MECHANICAL ENGINEERING PROGRAMME (DMEN)  
EGM1181: ENGINEERING DYNAMICS  
FINAL ALTERNATIVE ASSESSMENT: APRIL 2022 SESSION

**Instructions:** This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions.

**Question 1**

- (a) From Figure 1(a), initially the motor on the circular saw turns its drive shaft at  $\omega = (20t^{2/3})$  rad/s, where  $t$  is in seconds. If the radii of gears  $A$  and  $B$  are 8 mm and 25 mm, respectively, determine the magnitudes of the velocity and acceleration of a tooth  $C$  on the saw blade after the drive shaft rotates  $\theta = 5$  rad starting from rest.

(14 marks)

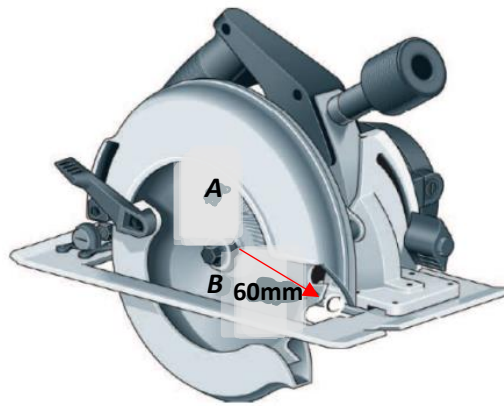


Figure 1(a)

- (b) If crank  $AB$  rotates with a constant angular velocity of  $\omega_{AB} = 6$  rad/s as shown in Figure 1(b), determine the angular velocity of rod  $BC$  and the velocity of the slider block at the instant shown. The rod is in a horizontal position.

(11 marks)

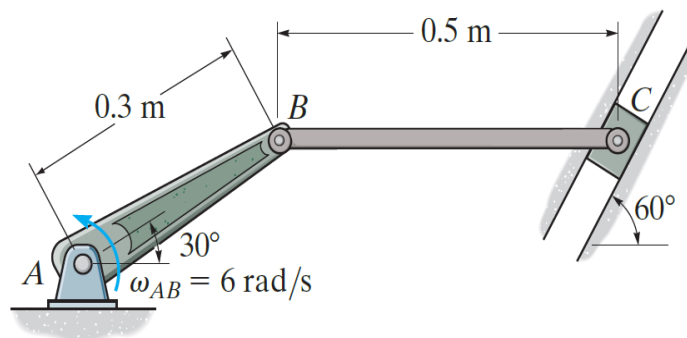


Figure 1(b)

**Question 2**

In Figure 2 shows block  $B$  of the mechanism is confined to move within the slot member  $CD$ . If  $AB$  is rotating at a constant rate of  $\omega_{AB} = 3 \text{ rad/s}$ , determine the angular velocity and angular acceleration of member  $CD$  at the instant shown.

(25 marks)

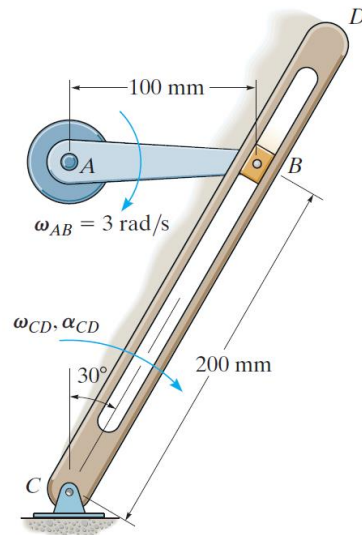


Figure 2

**Question 3**

As illustrated in the Figure 3 the mechanism is subject to a load **D** of 4.5 kg. The pulley mechanism is utilized to lift the load where the cable **B** is initiate to constantly acceleration of  $185 \text{ mm/s}^2$  with initial velocity of  $285.7 \text{ mm/s}$ . Given  $R_1 = 110 \text{ mm}$  and  $R_2 = 86 \text{ mm}$ . Determine the following parameters:

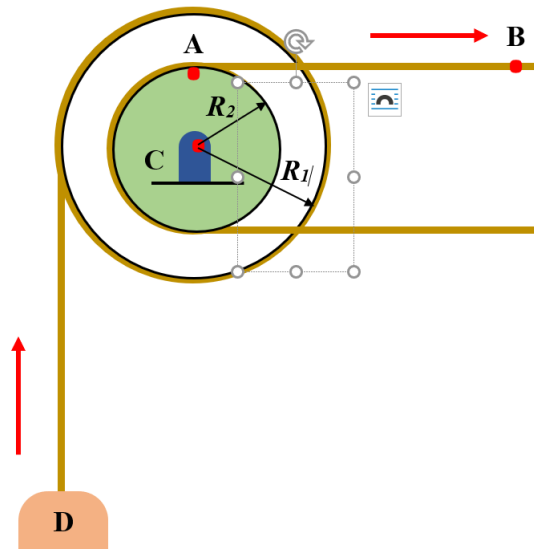


Figure 3

- (a) number of revolutions of the pulley at 2.6 s. (12 marks)
- (b) the velocity and change in position (in meter) of the load **D** after 2.6 s. (5 marks)
- (c) acceleration and angle of the component of the point **A** on the inner pulley at  $t = 0 \text{ s}$ . (8 marks)

### Question 4

- (a) From Figure 4(a), determine the vertical and horizontal components of reaction at the pin support  $A$  and the angular acceleration of the 12-kg rod at the instant shown, when the rod has an angular velocity of  $\omega = 5 \text{ rad/s}$ .

(11 marks)

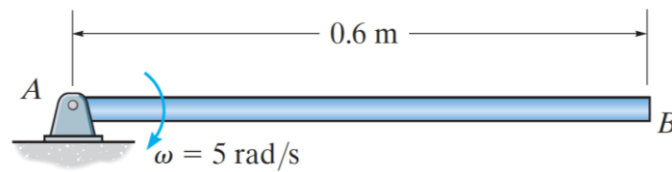


Figure 4(a)

- (b) Figure 4(b) shows, the 30-kg reel is mounted on the 20-kg cart. If the cable wrapped around the inner hub of the reel is subjected to a force of  $P = 50 \text{ N}$ , determine the velocity of the cart and the angular velocity of the reel when  $t = 4 \text{ s}$ . The radius of gyration of the reel about its center of mass  $O$  is  $k_o = 250 \text{ mm}$ . Neglect the size of the small wheels.

(14 marks)

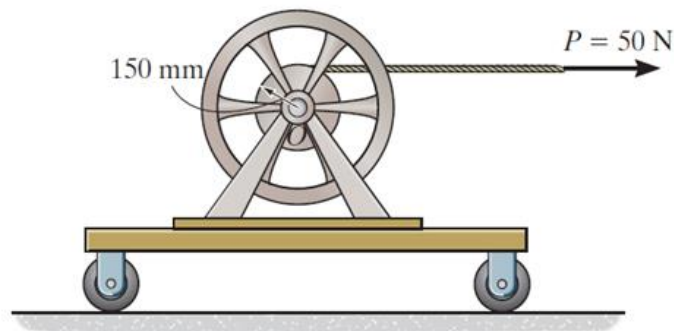


Figure 4(b)

**-THE END-**